AVIATION WEEK

JULY 3, 1950

A McGRAW-HILL PUBLICATION

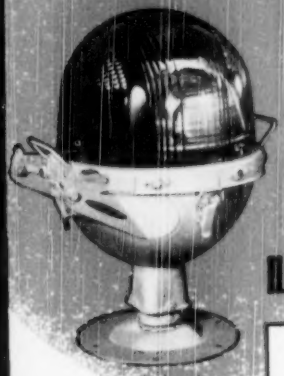
John Casey at Chicago knows!

Chicago's big Midway Airport is one of the busiest in the world. And John A. Casey, its manager, is a leader in progressive airport operation. He knows how important it is to avoid delays in landing and take-offs. Mr. Casey says: "The installation of the high intensity runway lights at Chicago Midway Airport in 1948 was the 'missing link' in the completion of the chain of landing aids used under conditions of restricted visibility. The high intensity runway lights are a perfect implementation of the ILS and GCA. All comment has been extremely favorable, with not one complaint."

H. C. Wright at Nashville knows!

When you ask the men who know, you'll invariably get an enthusiastic answer from H. C. Wright, the capable superintendent of Berry Field. "We've had some remarkable experiences here since we installed high intensity lights on our instrument runway, and their performance has been most gratifying to pilots and to the city. The controllable beam eliminates glare while taking full advantage of the high candle power. The lights are most definitely paying for themselves in improved operation and increased safety for ships and passengers. We are amazed at the unusually low operating cost of the high intensity lights. We've had three knocked down by incoming aircraft and they were reinstalled at a very nominal cost."

ask the men who KNOW L-M high intensity runway lighting!



● Airport managers, airline men, and pilots who use and know L-M High Intensity Runway Lighting can tell you from their own experiences, and from situations that they personally have observed, how important it is to have good lighting to delineate the runways in good weather or bad. Ask some of the men who know. Then ask the L-M Field Engineer for details, or write Airport Lighting Division, Line Material Co., East Stroudsburg, Pa. (a McGraw Electric Company Division).

LINE MATERIAL Airport Lighting

Hank Cross at Birmingham knows!

"When I was test flying B-29's here during the war and until 1949, the blackest area north and east of the city from the air was the municipal airport. The mountains and smog conditions peculiar to Jones Valley added to the problem," writes H. T. Cross, well-known Director of Aviation of Alabama's biggest municipal airport. "Last fall we installed high intensity lighting on all three runways. Airlines, pilots, and tower operators are all most enthusiastic. Pilots report seeing the lights more than fifty miles away. Typical pilot's comment: 'Now I won't be trying to let down on the First Avenue street lights instead of the runway!'"

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These leading U. S. Navy

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are *POWERED* by Westinghouse

All twin engine fighters for the Navy's newest carrier-based jet squadrons are powered by the J-34. This light and slim Westinghouse engine lends itself ideally to a twin engine installation which in turn provides the reassuring safety factor of single engine operation in times of emergency.

The designers of these airplanes chose the J-34 because it combines high power with low weight. These features plus the power, dependability and performance of the engine assure that the air striking force of the United States Navy will be second to none.

J-34003-D

Westinghouse

AVIATION GAS TURBINES

B.F.Goodrich

It's rough on subs, smooth on runways

ARMED with electronic search equipment, plus torpedoes, rockets, cannon and machine guns, the Navy's Lockheed Neptune is designed to hunt down the formerly radar-proof "snorkel" submarines. With all this equipment to carry, engineers had the problem of shaving every possible pound off the plane design. When it came to the wheel and brake assembly, they turned to B. F. Goodrich.

B. F. Goodrich Expander Tube Brakes can be designed lighter for a given amount of kinetic energy than any other brake. The new spider-type frame is both lighter and stronger. The brake lining is mounted on magnesium shoes—a type of construction that is lighter, yet gives longer wear. And the wheels themselves are light, strong magnesium castings.

As a result, the B. F. Goodrich assembly on the Lockheed P2V-4 saves considerable weight over other designs. *And* it provides smoother, safer take-offs and landings. BFG brakes cannot lock or grab. They respond smoothly and quickly to minimum pressure. They take emergency overloads better.

BFG brakes also increase plane availability. There's less in-shop time for replacement and repair. Relining jobs can be handled with a screwdriver and wrench. Wear on all parts is slower because the load is evenly distributed.

The main wheels and nosewheel on the Neptune are equipped with B. F. Goodrich tires and tubes for maximum safety and economy. This complete B. F. Goodrich wheel assembly is one of many effective solutions to aviation problems perfected by B. F. Goodrich research. *The B. F. Goodrich Co., Aeronautical Div., Akron, Ohio.*

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ROEBLING

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Aviation Week

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SKYWAYS, INC. at Vandalia (Dayton) Ohio, is an airport operation to model after. Visiting flyers get the personal attention of the heads of the business—Don E. Carroll and Blaine D. Stoltz (see small photo). "We're proud," they say, "of the quality of our service and products. And Texaco's quality and nation-wide reputation have been big factors in building our business."

Skyways, Inc. backs it up with TEXACO LUBRICANTS AND FUELS

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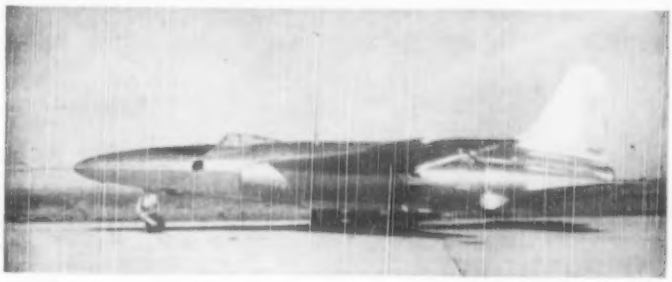
TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

News Picture Highlights . . .

SO.M2 RESEARCH PLANE

France's sleek Sud-Ouest M2 (right) is a military research type for investigating sonic flight problems and also serves as a flying "model" for the projected SO.4000 twin-Nene-powered bomber. The M2 has a Derwent. Landing gear consists of three main wheels in tandem, single nosewheel, and outriggers, all retractable. Swept wings have slots. The M2 has attained a speed of 1000 km./hr. (AVIATION WEEK June 26) without encountering compressibility difficulties.

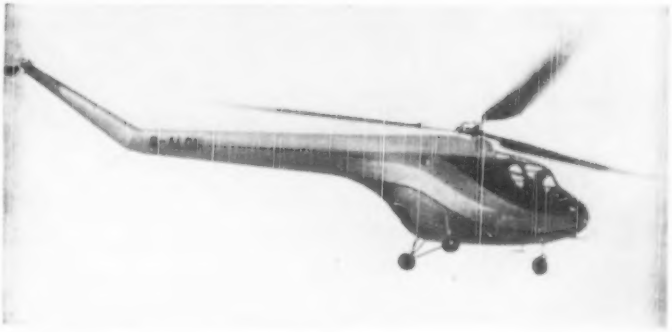


TAY-VISCOUNT MAKES DEBUT

First British plane to be powered by Rolls-Royce Tay is this first of two modified Vickers Viscount (left) which has started flight tests. The installation was ordered by the Ministry of Supply to try out the Tay engine, which is a more powerful development of the Nene. Thus far no other installation of Tay engines in British planes is contemplated, and indications are the engine will not be put into large scale production.

BRISTOL 171 IN PRODUCTION

The Bristol 171 helicopter (right) is the first British-designed copter to go into production, although its use commercially is unlikely; main purpose will be as a research vehicle for development of the larger Bristol 173 twin-rotor design. Of the production models, one Model 171 will be used by British European Airways for operational trials, and the other will be delivered to the Ministry of Supply for testing by the Airborne Forces Experimental Establishment.



RAF FLYING CIRCUS

A trio of RAF Sikorsky R-6 helicopters (left) touched up by a skilled makeup artist to resemble the venerable pachyderms complete with trunks, eyes and ears go through their paces at the behest of a sartorially perfect "ringmaster." They are rehearsing a circus routine in preparation for the RAF show at Farnborough this week. Is there anything a helicopter can't do?

AIRBORNE

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AVIATION CALENDAR

July 7-8—Royal Air Force 1950 display, Farnborough airfield, England.

July 10-28—Air Age Institute lecture series, Parks Air College, E. St. Louis, Ill.

July 12-14—Annual summer meeting of the Institute of Aeronautical Sciences western headquarters building, Los Angeles.

July 14-16—National pilots air meet, including a national airplane trading day, sponsored by Chattanooga Flyers Club, Chattanooga.

July 16—Third efficiency race and air show, sponsored by Mansfield Aviation Club, Inc., Mansfield, O.

July 21-23—9th annual all-Ohio air tour, sponsored by Cleveland Junior Chamber of Commerce.

Aug. 2-13—17th National Soaring Contest, Grand Prairie, Texas.

Aug. 7—Lions Club Air Meet, Sky Harbour Airport, Goderich, Ontario, Canada.

Aug. 7-18—Special two-week program on high temperature ceramics, Massachusetts Institute of Technology, Cambridge, Mass.

Aug. 7-20—First United States International Trade Fair, Chicago.

Aug. 19—Tennessee air progress conference, Knoxville.

Aug. 19-20—California Air Freight Clinic, sponsored by Calif. Aeronautics Commission and Oakland Chamber of Commerce Aviation Committee, Oakland.

Aug. 25-17—Fourth annual Air Force Association convention, Hotel Statler, Boston, Mass.

Sept. 5-10—Eleventh flying display and exhibition, Society of British Aircraft Constructors, Farnborough airfield, England.

Sept. 7—Pratt & Whitney distributor operation and maintenance meeting, Pacific Airmotive Corp., Linden, N. J.

Sept. 9-10—Third annual convention of the California Wing of the Air Force Assn., Arrowhead Springs Hotel and Spa near San Bernardino, Calif.

Sept. 10-14—Instrument Society of America instrument conference and national exhibit, the Coliseum, Houston, Tex.

Sept. 12-14—Conference on ground facilities for air transportation, Massachusetts Institute of Technology, Cambridge, Mass.

Sept. 18-22—Fifth national instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y.

Sept. 28-30—14th annual convention of International Northwest Aviation Council, Sun Valley, Idaho.

Oct. 12-13—1950 conference on airport management and operations, May Westheimer Field, North Campus, University of Oklahoma, Norman, Okla.

Oct. 16-20—1950 annual general meeting of the International Air Transport Assn., Fairmont Hotel, San Francisco.

Oct. 26-27—5th annual aviation conference, sponsored by aviation committee of Tucson Chamber of Commerce.

PICTURE CREDITS

7—McGraw-Hill World News, McGraw-Hill World News, Keystone Pictures, INC.; 25—NACA; 26—Blackburn & General Aircraft Ltd.

NEWS DIGEST

DOMESTIC

Howard Hughes' giant XH-17 jet-powered copter tore loose from its moorings June 22 during ground tests of its 136-ft rotor blades. USAF has released no information as to the cause of the accident or extent of damage.

The National Air Council transferred its quarters from New York to Washington, D. C. to facilitate its dealings with government agencies, national groups and aviation associations. New address is Suite 625, DuPont Circle Building, 1346 Connecticut Ave., NW, Washington 6, D. C. Telephone number is North 2118.

Northwest Airlines Air Coach DC-4 crashed into Lake Michigan June 24 killing all 55 passengers and crew of three. It was the nation's worst air disaster. Plane captain's last report stated that the DC-4 had encountered a severe electrical storm and high velocity winds. The plane had left New York and was en route to Minneapolis.

National Airlines is considering a daytime New York-Miami DC-6 air coach service at 4½ cents-a-mile fares. It would complement present night DC-4 coach flights which have 4 cents-a-mile fares.

Boeing's $9,045,000 suit against the Aero Mechanics Union and International Assn. of Machinists has been dismissed in Seattle federal district court. But the company will appeal to the U. S. Circuit Court of Appeals. Boeing asked damages for the 140-day strike conducted by Aero Mechanics at its Seattle plants in 1948, but the court agreed with earlier rulings that although the strike was illegal, the company lost its right to sue when it rescinded its contract with the union on the initial day of the strike. IAM was held blameless since it did not call the walkout and did not sanction the strike until six days after it started.

Maj. Gen. Roger M. Ramey left his command of the Eighth Air Force to become director of operations at Air Force headquarters in Washington, D. C. Maj. Gen. Samuel E. Anderson is taking over Ramey's former post.

An RAF night fighter team will be assigned to Aircraft, Fleet Marine Force, Atlantic, Cherry Point, N. C., as part of the interservice exchange policy to familiarize various services with each others activities.

Centralized leasing of space at U. S. international airports for use by government agencies is planned. Under the new setup, the General Services Administration would correlate needs of various agencies desiring space at these terminals and arrange "single package" contracts with each airport.

Charles Lanier Lawrance, aviation pioneer and inventor, died at his home on Meadow Farm, L. I., N. Y., June 24. He was 68 years old. He was best known for his development of the famed Wright Whirlwind engine. Lawrance headed Wright Aero Corp. from 1923 to 1928 and was vp from 1928 to 1930. He then formed Lawrance Engineering and Research Corp. He was president of the Aeronautical Chamber of Commerce in 1931 and 1932 and head of the Institute of Aeronautical Sciences in 1933-1934.

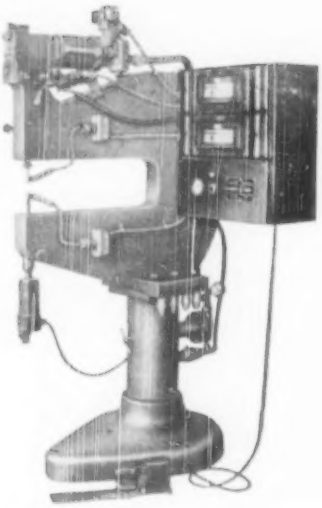
Second North American AJ-1 attack bomber exploded in the air last week near Bedford, Va., killing its three crewmen. The plane, enroute from Edwards AFB (Muroc) Calif. to Patuxent Naval Air Station, Md., on its first transcontinental test hop crashed in flames about 50 miles from its goal. The plane was powered by two Pratt & Whitney R-2800-34W engines and one Allison J-33A turbojet. Details of crash are still unknown. A similar mishap last year destroyed the first AJ-1 during a test flight on the West Coast.

INTERNATIONAL

U. S.-Spanish air transport agreement has been amended to give Spain two trans-Atlantic routes. From Spain to San Juan, Puerto Rico, and Caracas, Venezuela, via Lisbon, the Azores and Bermuda; and from Spain to Miami, Mexico, Havana, Caribbean and South American points via Lisbon, the Azores and Bermuda. The U. S. has two routes through Spain.

W. H. Moss, British light aircraft designer and builder, was killed when the Mosscraft he was piloting in the King's Cup Race crashed during a pylon turn. He was 45 years old.

Turnover of Airline Transactions handled by the International Air Transport Assn. Clearing House during April was $13,787,000, an increase of over $2 million compared with the same month last year. Quarterly transactions rose $50,087,000 for the first four months of 1950 compared with $46,571,000 for the same period in 1949.



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One Example: Shell's PLANNED UPGRADING of aircraft fuels and lubricants . . .

PLANNED UPGRADING of fuels is shown in the new *Shell 80/87 octane fuel.* This 80-octane fuel with a guaranteed minimum rich mixture rating of 87-octane was made available by Shell on a nation-wide basis in 1949. It is the fuel which has engine-manufacturer approval for many models in place of 91-octane*.

Planned upgrading is also evident in the many Aeroshell Lubricants which meet the most exacting needs of modern aircraft. Such product superiority is the result of looking ahead, of anticipating needs, of continued research on a long-pull basis.

*Write for an up-to-date list of engines for which 80/87 octane fuel is approved by engine makers.

PLANNED UPGRADING is one of the three main runways of "Airport Success" which are:

1. Shell's Planned Upgrading of aircraft fuel and lubricants.
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3. Shell's Planned Merchandising program.

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WHO'S WHERE

Changes

Charles Froesch, chief engineer of Eastern Air Lines, has replaced **William Littlewood** as a member of the Committee on Aeronautics of the Research and Development Board, Dept. of Defense. Littlewood, vp-engineering for American Airlines, resigned from the committee because of illness.

Averill E. Adams has been named sales manager of Durham Aircraft Service, Woodside, N. Y., and **Al Linford** has been appointed branch manager at Windsor Locks, Conn. **Howard Meyer** has been made merchandising manager, with **John Boyle** named as new head of the purchasing dept. at Woodside, N. Y.

W. W. (Ted) Stevens has joined Glenn L. Martin Co.'s public relations staff. . . . **Emil P. Lapp** has been appointed chief product engineer at the Square D Co.'s Kollsman Instrument division. . . . **Charles D. Frazer**, formerly executive secy. and asst. treas. of the National Air Council, has been named executive vp of the organization.

Honors and Elections

IT'S NOW "DOC" GRUMMAN—Leroy Randle Grumman, chairman of Grumman Aircraft Engineering Corp., takes hold of his new honorary degree of Doctor of Engineering from Dr. H. S. Rogers, prexy of Polytechnic Institute of Brooklyn (right).

Reinout P. Kroon, engineering manager of the Westinghouse aviation gas turbine division has been awarded the Spirit of St. Louis medal of the American Society of Mechanical Engineers for "leadership in the development of the first American design of a turbojet powerplant for aviation service."

I. W. Burnham, II, and **Frederick F. Robinson** have been elected to the board of Greer Hydraulics.

Leonard S. Holstad, Northwest Airlines' treas., has been elected chairman of the International Air Transport Assn.'s financial committee.

INDUSTRY OBSERVER

Capital Airlines has obtained CAA approval on the installation in its DC-3s of Wright R-1820 G202 engines in place of R-1820 G102s without major rework to the engine bearer or carburetor, and without installation of cowl flaps. Elimination of the extra rework will save Capital more than $500,000 over a three-year period, so the airline has awarded a merit citation to Ralph Stowell, its engineer who is responsible for the change. Key to the approval is restriction of takeoff horsepower of the new engines to 1100 hp., but Capital, like other G202 operators, obtains an additional 50 hp. at cruise settings.

The so-called "grass roots" frequency for private pilots has received RTCA approval. Special Committee 56 recently reported, however, that 122.8 mc. is the only frequency available and some concern was registered since most lightplane radios are calibrated only to 122.0. The committee pointed out that this factor was not too important due to the fact that while the radio dial shows 122.0 as high limit, the radio actually reaches 122.8. While private interests anxiously fret to put the channel to immediate use, FCC is expected to take a minimum of two months to clear frequency for general usage.

Definite steps to enter the world market with a transcontinental jet transport have been taken by A. V. Roe Canada, Ltd., Toronto. Leadoff in the campaign will be an advertising broadside in business and aviation publications in Canada, U.S., Europe, South America, Great Britain, Australia and New Zealand. Four advertisements are planned which will stress "more passengers–fewer airplanes," "happier passengers–relaxed crews," "lower investment–higher profits," and "high serviceability–low maintenance."

First use of postwar non-American equipment on a scheduled Brazilian airline begins this month with Viacao Aerea Sao Paulo S. A. (VASP) placing a SAAB "Scandia" in service on the Rio-Sao Paulo run. The Scandia (three have been ordered) will do the 250-mile run in exactly one hour. This cuts 40 minutes from the time now required by Douglas "Dakota" transports used by VASP and the half-dozen other lines flying Brazil's most remunerative route.

"Swede" Golien, Ethiopian Airlines, Inc., executive, is in the United States negotiating for purchase of two Convair-Liners. Purchase is being arranged through Floyd Odlum's Airfleets, Inc. Consolidated Vultee turned over 15 Convair-Liners to Airfleets almost two years ago and the Ethiopian sale represents the first business of Airfleets. The Ethiopian line currently is flying six Douglas "Dakota" transports and one single-engine, Canadian-built, Norseman Mk. 5, on 4893 route miles between Addis Ababa, Cairo, Nairobi, Asmara, Bombay and Malakal.

Capital Airlines has made three major modifications to Air Stair doors on its DC-3s in an effort to eliminate the possibility of inadvertent opening in flight (AVIATION WEEK, Feb. 20) as has occurred at least twice. Rework consists of: installation of spring to bear on bell crank and increase the effort required to move latch; reduction of taper of engaging finger; and mounting a micarta block to increase bearing surface between finger and door sill attachment points.

Australia is setting up its air industry for conversion to jet aircraft manufacture, and plans an all-jet air force by end of 1953. Already in production with an order for 50 planes, is the de Havilland Vampire single-place Mk. 30 fighter-bomber. Plane is powered by Rolls-Royce Nene 4 developing 5000-lb. thrust. Second plane scheduled for Australian production is the Hawker N.7/46. Also powered by a Nene 4, the plane is a single-place fighter designed primarily for shipboard operation.

While the French aircraft industry will continue developing prototype civil and military aircraft of all types, preliminary agreements reached between signers of the North Atlantic Pact are that France will concentrate on production of fighter types exclusively and will be responsible for developing interception tactics for Western European Defense.

AVIATION WEEK

VOL. 52, NO. 27

JULY 3, 1950

Congress Straddles Issue on 70-Group AF

- **USAF gets the legal right to operate 70 groups and supporting squadrons, but not the money.**
- **And chances of getting the money are slight as long as the President says we can't afford it.**
- **Result: No national policy to buy new planes every year, no safeguard against an obsolete force in 1953.**

Advocates of an up-to-date Air Force and a robust, rapidly expandable aircraft manufacturing industry have suffered a crushing policy defeat—at least on paper.

It came on the House-Senate compromise version of legislation setting the statutory composition of USAF.

A House-approved stipulation authorizing USAF to procure 5200 aircraft (or 42,500 airframe-tons) annually, the key to a modernized striking force and a healthy industry, was stricken out of the measure. The conference compromise—the House and Senate were expected to rubber-stamp it—makes no provision whatever for annual procurement of new aircraft.

▶ **Policy of Obsolescence**—This would mean that, as far as "the law" goes, there would be no national policy to keep USAF continually supplied with the latest equipment. By omission, it would subscribe to a policy of a USAF of obsolescent planes. The fact that 70 percent of the 13,000 aircraft in USAF's current active fleet were designed before 1940 shows that this has been the policy since the war's end, as well as the indicated future policy.

Actual strength depends on the year-to-year appropriations for the air arm.

▶ **Legal Ceiling Set**—The authorization legislation approved by the conferees last week is simply a statutory declaration of national policy. It sets the "legal" ceiling-strength for USAF. Although a "paper" proposition, it is an important one. With legal status, for example, it would carry more weight than such non-statutory paper recommendations as the reports of the President's Air Policy Commission and the Congressional Aviation Policy Board.

The measure settled on was the result of give-and-take between House conferees, led by Rep. Carl Vinson, chairman of the House Armed Services Committee, fighting for a strong USAF statute, and Senate conferees. Led by Sen. Virgil Chapman, the Senate group sided with the President's Budget Bureau, backing a statute watered down to virtual meaninglessness.

▶ **Compromise Provisions**—Here are the key provisions of the compromise:

- **Groups.** USAF would have "an authorized strength of not to exceed 70 . . . groups and such separate . . . squadrons, reserve groups, and supporting and auxiliary . . . reserve units as may be required." The House bill had spelled out 70 groups, 22 separate squadrons, and 61 reserve groups, together with necessary supporting and auxiliary units." The Senate bill had set no group strength.
- **Planes.** USAF's authorized plane strength would be 24,000 serviceable aircraft, or 225,000 airframe-tons. This is the force required for a 70-group program. Both bills subscribed to it. The Budget Bureau went along with the stipulation, since, in the absence of an annual procurement policy, it could mean virtually nothing. The 24,000 aircraft could all be obsolescent.
- **Guided missiles.** USAF is explicitly authorized to develop and procure guided missiles. Senate conferees agreed to this in exchange for the House conferees to strike out the provision for annual procurement of 5200 planes.
- **Commercial prototypes.** USAF is barred from engaging in "the design or development of any prototype aircraft intended primarily for commercial use." This will, however, leave the door open for USAF to continue to purchase existing types of planes which were originally designed for commercial use.

Under the sweeping provisions of the Senate bill, aircraft manufacturers were apprehensive that this might be prohibited. Under the House bill, it would have been possible for USAF to engage in development of commercial prototypes adaptable for auxiliary military use, although USAF reported it had no intention of doing so.

- **Personnel.** A ceiling of 502,000 military personnel, including a maximum of 27,500 officers, is authorized for USAF. This was the House recommendation. The Senate bill would have trimmed the officer strength to 22,400. By comparison, the Army's authorized personnel strength is set at 837,000.

▶ **Truman Adamant**—Meanwhile, despite testimony by the top military command that the present USAF of 48 groups is "woefully weak," air power suffered another blow last week.

The President unequivocally repeated to his press conference that the country, for lack of cash, could not and would not support a larger air arm. This, however, was before the start of the Korean civil war.

This declaration coincided with the completion of congressional action on legislation authorizing $2 billion additional to the Commodity Credit Corp. for purchase of surplus farm products. It also coincided with release of these statements before the Senate Appropriations Committee on the 1951 fiscal year defense budget:

- **Gen. Omar Bradley,** Chief of Staff: "This Air Force (the 48 groups) is not as big as it might be . . . If we could afford it, I do wish that we had some more groups."
- **Gen. Hoyt Vandenberg,** Chief of Air Staff, agreed that the USAF is "woefully weak": "We believe the number of groups we have is below the minimum force that we think is the minimum required."
- **USAF's reserve pool** of modern combat planes to sustain air operations during an 18-month mobilization period of the industry will hit the zero point by 1953, ex-Secretary for Air Stuart Symington, now chairman of the National Security Resources Board, emphasized.

Pointing to recommendations of the President's 1948 Air Policy Commission that the USAF build up a reserve strength of 8100 modern aircraft by 1953, he observed: "As of that date, based on current procurement plans, the Air Force will have no modern aircraft to apply against this recommended reserve . . . to bridge the gap between the war mobilization of the aircraft industry and those early losses which would be sustained when any possible aggressor has attained a significant atomic capability.

"Without such a reserve, the rate of operation of Air Force combat units would be sharply reduced shortly after the beginning of hostilities, and would progressively decline until such time as the aircraft industry could expand to an output sufficient to meet combat losses.

That time is estimated at not less than 18 months."

• **Of the 13,000 aircraft** in USAF's active fleet, 17 percent had their designs laid before 1935.

• **Air-to-air projectiles** will be given increasing emphasis by USAF in its guided missile program. "Future fighters at some stage will have such weapons as their principal armament," Symington said.

• **Existing fighters** are deficient in their ability to stop attacks of modern, high-speed, high-altitude bombers under conditions of darkness or bad weather, Symington reported: "The latest reciprocating-engine fighters do not have the required performance, and the faster turbojet fighters do not yet possess the radar essential to all-weather operations."

• **Secretary of Defense** Louis Johnson told Senators: "I want to reemphasize that the research and development of the new planes will be stressed, restressed, and given top priority." But the facts are: That the 1951 fiscal year budget allocates USAF $205 million and Naval aviation $74 million for research and development.

For the 1950 fiscal year, even with Truman-Johnson expounding of funds, USAF had $210 million (or $5 million more) and Naval aviation, $77 million ($3 million more) readily available for research and development.

• **Vice Adm. John Price**, vice chief of Naval Operations for Air reported: "For the past several years our annual level of expenditure in the research and development area has averaged well in excess of $100 million. The level of new appropriations has been substantially lower than the level of expenditures, and, as a result, we are now confronted with the problem of contracting our effort in this area."

AA Ignition Order

American Airlines has ordered low tension ignition systems from the Scintilla Magneto division of Bendix Aviation Corp. to equip all its R-2800 Pratt & Whitney engines.

Amount of the order was not disclosed, but reportedly is in the neighborhood of $2 million. More than 400 powerplants on both Convair 240s and Douglas DC-6s are involved in the conversion project.

Other aircraft Scintilla expects to supply low tension systems for include French SO 30Ps, North Stars, and Martin 404s, purchased by TWA and Eastern Air Lines.

Eastern, Panagra and American, the division said, consistently have obtained more than 800 hours on their spark plugs, without change, in trials of the Scintilla system.

Aid Plan May Triple Jet Output

Joint Chiefs favor newer fighters for North Atlantic Treaty nations; four types involved.

U. S. jet aircraft production will triple this year if a plan promulgated by the Joint Chiefs of Staff to give North Atlantic Treaty nations first-line air equipment is approved by State and Defense Departments and signer nations involved.

Under the plan, major signatories of the treaty participating under Mutual Defense Assistance Programs will be eligible to receive Lockheed F-80B, Republic F-84D, Chance Vought F6U-1 and North American FJ-1 jet fighter planes. Exact numbers of planes contemplated by the plan is a closely guarded secret. But the quantity is sufficient, AVIATION WEEK was told, to warrant increased production of current military aircraft.

Details of the plan now being thrashed out by working levels of State and Defense Department MDAP groups are extremely complicated. From the point of security classification of aircraft and components alone the proposal is staggering. The problems of supply and maintenance of the equipment after receipt by treaty nations is just as complex.

Basis for the plan is twofold in scope:

• **First**, solid obligation has been voiced by treaty nations that while any military air equipment is welcome, obsolescent aircraft, such as Navy Helldivers and Hellcats delivered recently under MDAP, would be little more than useless against an aggressor. This obligation has also been raised by U. S. brass who feel that obsolescent aircraft should be used for training purposes by reserve and guard components and gradually withdrawn from service use by attrition and cannibalization.

• **Second**, of vital concern to the Joint Chiefs of Staff is the fact that the total number of combat aircraft operational to USAF and Navy has been on the decline since 1945. Despite continued warnings by groups such as the President's Air Policy Commission, headed by newly appointed Air Secretary T. K. Finletter, annual budget reductions continue to chip funds from air power. Fiscal 1951 budget proposals will not even maintain present production level.

▶ **Revise Critical Date**—The critical date envisioned by the Joint Chiefs of Staff as the time an aggressor would be most likely capable of sustained action against this nation is Jan. 1, 1954. The international scene, however, continues to worsen, and Defense Department sources predict that the crisis date will likely be revised forward to the original date set in the 1947-48 Finletter report Jan. 1, 1955.

The number of aircraft comprising USAF strength today is set at approximately 17,500, of which only 3500 are first-line combat aircraft. Navy has 15,500 aircraft on hand with only 2200 first-line combat types. Procurement of new aircraft for USAF out of fiscal 1950 funds is pegged at 1250 planes and for the Navy at 789 planes.

Problem facing Congress, Defense and State Departments is how to bolster the air industry production of military planes without substantially increasing military air budgets. The aircraft industry in the United States, dependent upon military orders for more than 80 percent of its annual production, employs approximately 203,500 in airframe and engine manufacture and another 11,500 in propeller manufacture. This is less than 15 percent of those employed by the air industry at the peak of World War II.

Aircraft Industries Assn. estimates that the industry's current production of approximately 150 military aircraft per month could be tripled annually to approximately 495 combat planes per month by July 1, 1951, and to nearly 1500 planes per month in 1952. These statistics are valid only if adequate personnel can be found and their training accomplished. And, just as important, if machine tools and aircraft and engine components material are readily available.

▶ **Production Problem**—Facing the industry and the military if expansion were suddenly mandatory is the scarcity of materials needed to produce today's modern, electronic-equipped, jet-powered, bombers and fighters. In March 1950, military backlog in orders amounted to $2.9 billion. Of this amount, $1.9 billion is for airframes, $761 million for engines and $97 million for propellers.

The Joint Chiefs' plan to provide treaty nations of the North Atlantic Pact with first-line aircraft is not now being circulated among policy-making levels and, according to reports, is meeting enthusiastic reception all along the line of command of government and military services concerned.

If adopted, the still economically crippled air industry will be revitalized and be able to start the climb to within the minimum safety limits of production capacity set for it by the Fin-

letter Commission early in 1945.

► **Four Types Considered**—So far, only the four types of jet fighter planes are under consideration for equipment of MDAP nations. If the program is adopted, other jet aircraft undoubtedly will be added to the list of U. S. production aircraft in foreign service.

The Lockheed F-80B is armed with six 50-caliber machine guns firing 1200 rounds per min per gun. Span is 38 ft. 10½ in; length, 34 ft. 6 in.; height, 11 ft. 4 in. Weight empty, is 8200 lb.; loaded 15,400 lb.; speed, 605 m.p.h.; ceiling, 46,000 ft.; range 1100 mi. 240 F-80B fighters were ordered by USAF in 1947.

The Republic F84D is armed with six 50-caliber machine guns and eight 140-lb. rockets. Span is 37 ft. 5 in.; length, 36 ft. 5 in.; height, 12 ft. 10½ in. Weight empty, is 9155 lb.; loaded, 12,881 lb. Speed at 30,000 ft. 575 m.p.h. Ceiling is over 45,000 ft. and range is 1700 mi.

The Chance Vought F6U-1 is armed with four 50-caliber machine guns. Span is 32 ft. 6 in.; length, 37 ft. 7 in.; height, 11 ft. 9 in. Empty weight is 7560 lb.; loaded, 11,300 lb. and service ceiling is 38,000 ft.

The North American F1-1 is armed with six 50-caliber machine guns. Span is 38 ft. 1 in.; length, 33 ft. 7 in.; height, 14 ft 6 in. Gross weight is 12,697 lb.; max. speed is 550 m.p.h. and range with drop tanks is 1500 mi.

National Air Races Put Off Until 1951

Flat refusal of Defense Secretary Johnson to permit military aircraft to fly in the National Air Races has forced postponement of the 20-year-old classic from the Labor Day week-end to Armed Forces Day in May 1951.

Johnson, in reply to Air Race President Frederick Crawford's "annual invitation" to the armed forces (AVIATION WEEK June 19), declared that reasons of economy and training forbade his approval for participation of military personnel and aircraft in the show. He said further that all demonstrations of military prowess—Army, Navy and Air Force—henceforth would be displayed on Armed Forces Day only.

Crawford, after failing in his efforts to get Johnson to reconsider the ban, in a bold stroke of strategy declared the races postponed until Armed Forces Day, 1951. "It is hoped", he said, "that this spring date will make possible the complete co-operation of the Armed Forces so that the units may be assigned to Cleveland's air event in connection with the celebration of the service's big day."

Military participation in the races at Cleveland's Municipal Airport each year admittedly has been the main drawing card of the event, which through the years has assumed international importance. If Johnson fails to grant military aircraft permission to fly at Cleveland next Armed Forces Day it might well spell the end of the annual classic.

There has been a notable lack of interest during the last three years on the part of the air industry as well as the military in the races. The danger of crashes of military aircraft performing at high speeds before crowds of thousands of air enthusiasts has long been a headache to the industry concerned with keeping its product favorably in the public eye. The military, similarly, is doubtful of the value of publicity to the air forces and even more doubtful of the "training value".

Crawford, meanwhile, announced a new plan for the races. The Bendix Trophy Race, a transcontinental speed dash, and the Thompson Trophy Race, a speed dash around pylons, are to be continued to jet aircraft. The Continental Trophy Race will remain open, he said, to light planes flying around pylons in view of the grand stand.

The Defense Department remained silent on Crawford's plan for military participation in next year's National Air Races.

Northrop X-4 Ready For Transsonic Test

An NACA test pilot will soon begin exploratory flight test probes into the relatively unknown transsonic speed range of flight, piloting the Northrop X-4 research plane.

The pilot, John H. Griffith, who flew 189 missions in USAF fighters in World War II, was recently assigned to conduct the interesting new research mission to take place at Edwards AFB, Muroc, Calif.

Prior to Griffith's starting his program, Capt. Charles E. Yeager, world's first supersonic pilot (AVIATION WEEK Dec. 22, 1947), will do approximately 10 hours of special preliminary tests for the Air Force. The NACA pilot will then begin his experiments, equipped with data supplied by Capt. Yeager and Northrop test pilot Charles Tucker, from earlier flights.

The tiny sweptwing X-4s are designed to fly in the speed range around the 650-mph. mark, just below the speed of sound at sea level to determine flight phenomena in this speed region.

They have 25 ft. wing spans, and are about 20 ft. long. Controls are Northrop elevons—combination ailerons and elevators—and the planes have no horizontal stabilizers or elevators, only a vertical stabilizer and rudder. Power plants for each plane are two Westinghouse 19XB2B engines of 1600-lb. thrust power each.

Brig. Gen. Al Boyd, commanding officer at Edwards AFB, announced that the X-4s had completed their acceptance tests after 18 months of preliminary flying and other testing by Northrop crews.

Guided Missile Test Centers Realigned

In an attempt to pin down missile research and development costs (AVIATION WEEK April 24), Secretary Johnson has ordered that management for the armed services' three major guided-missile test centers each come under the jurisdiction of a single service.

Under the order the Joint Long Range Proving Ground at Banana River, Fla., becomes the "USAF Long Range Proving Ground Division." Originally it was planned for this test center to operate under the direction of the Joint Chiefs of Staff with the USAF as executive agent.

Holloman AFB, Alamogordo, N. M., is transferred to the Army which will be responsible for both the White Sands Proving Ground and the adja-

YF-96A IN FIRST FLIGHT

Republic's new sweptwing version of its F-84, the YF-96A, pictured as the Air Force put it through its initial flight tests at Edwards AFB, Muroc, Calif. Power is provided by an Allison J-35-25 turbojet engine. Ground photos of the YF-96A appeared in AVIATION WEEK May 15 (p 17).

cent Holloman base. Navy will continue operations at Point Mugu, Calif.

Realignment of management was laid officially to "purposes of efficiency and economy."

Real purpose involved in the service designation of command is twofold:

- **To halt interservice bickering** as to duplicating research.
- **To determine which** service missile research test center gets the most out of budgetary allocation of funds.

ATA Buys Flight Recorders for Tests

The Air Transport Assn. recently purchased 24 flight recorders for test purposes at a total cost of $45,000.

General Electric, Hathaway and Control Instruments, Inc., each supplied eight instruments. They are installed on aircraft of 16 airlines participating in the test.

The instruments are of the electrically driven, continuous recording type. They record altitude and vertical G accelerations. They are mounted in the tail of the aircraft where chances of remaining intact in case of a crash are best.

Al Dallas of ATA told AVIATION WEEK that the purpose of the tests is to determine the instruments' reliability. The CAA does not now require the use of flight recorders.

RAIDER'S VERSATILE "FEET"
Northrop's C-125 Raider transport incorporates a neat landing gear design trick enabling the craft to be switched from single to dual wheels in a matter of minutes. For normal landings the Raider ordinarily uses single main wheels. But for operations from soft terrain, a second set of wheels can be installed to increase wheel-print area. Note auto-type jack used to permit installation.

Minimum Wage: Industry Lesson

Determination for aircraft workers shows Business the dangers of wage increases by administrative action.

By Rudolf Modley

The aircraft minimum wage case which led to the setting of $1.05 as the minimum wage for the aircraft industry has given management a shock which promises to have consequences reaching far beyond this industry.

- **It has awakened** other industries to the threat of wage increases by administrative decision through the present interpretation of the Walsh-Healey Act by the Secretary of Labor.
- **It has drawn** more sharply than ever before the battle lines between the secretary on one side and industry on the other. Many industry representatives tend to identify labor's position with that of the secretary. While this is generally correct, the following quotation from "a public release in defense of freedom of labor," shows the beginning of doubts in labor's ranks on activities such as the secretary's: "Labor does not choose to have its welfare determined by the administrative orders of government officials no matter how well intentioned they may purport to be." (AFL Electrical Workers statement on Public Ownership, May 22, 1950.)
- **It has brought** into sharp focus the fact that the secretary refuses to define what "a prevailing minimum wage" is, and that he clothes his determinations in such obscure and vague language that he has to defend himself against charges of "capricious" determinations.

▶ **Spirit and Letter**—According to the New York Times, the Secretary of Labor said in announcing the new aircraft wage that "in making these determinations we have lived up to the spirit and the letter of the law".

Actually, the language of the Walsh-Healey Act in regard to prevailing minimum wages is so confused that it has been largely disregarded ever since the Act was passed. The law says "all persons . . . will be paid . . . not less than . . . the prevailing minimum wages for persons employed on (1) similar work, or (2) in the particular or (3) similar industries or (4) groups of industries currently operating in the locality".

All but the second alternative were soon found to be unusable by those charged with enforcing them. As far back as 1939, O. A. Strackbein, a member of the Public Contracts Board at the time, wrote that alternatives 1, 3, and 4, were, respectively, "clumsy and wasteful," "superfluous," and "deficient in nearly all possible applications."

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Nobody has ever been able to figure out if the term "in the locality" was meant to apply to all four alternatives or only to the last one. The "letter of the law" actually gives little or no guidance.

▶ **Administration**—The Labor department relies on the second alternative, the wages "in the particular industry," as the only usable one. Occasionally it takes into account "locality," giving the word so broad an application that it rarely finds more than three "localities" in the entire United States.

In the administrative process the word "minimum" has undergone an even more astonishing metamorphosis than the word "locality." In most determinations, the secretary bases his finding of the "minimum" on a survey of straight time hourly earnings for all workers, regardless of skill and advancement, instead of considering entrance rates as the only true minimum rate. "Minimum" rates are, therefore, determined on the basis of averages which include workers at the maximum of the rate range.

Webster, who defines minimum as "opposed to maximum," probably would have a hard a time in arguing before a minimum wage panel or hearing as industry does.

Webster and the Secretary of Labor agree in their definition of the term

"prevailing." Yet, the term is applied in a way which defies logical analysis. Thus, we find ourselves in a wonderland in which the United States is a "locality," a maximum is "minimum," and all kinds of percentages pop up as "prevailing."

▶ **Just a Start**—Yet, the end result is deadly serious for the employer who has to pay the bill. Determinations which are supposed to eliminate "substandard practices" have a tendency to affect a large percentage of all plants and to bring about wage increases for a substantial percentage of all workers. Worst of all, these wage increases could lead to new determinations, which in turn might lead to new wage increases—and so on, in a never ending treacherous spiral.

This is of special importance to the aircraft industry because it is probably the only industry in which a determination not only offers an opportunity for ever-increasing wages but also prevents any lowering of the minimum as long as the Walsh-Healey Act is in force. Even if wages in industries not engaged in government work should ever go back to 1946 levels, the aircraft industry will remain unaffected by any such decline.

This is so because practically the entire industry works for the government and has to adhere to the minimum as now set. The cost to the government in case of such a decline from 1948 wages has been estimated as about $91 million per year in wage differentials. From today's wage levels it would be even greater.

▶ **No Legal Recourse**—In spite of the weaknesses of the law there seems to be no legal recourse against determinations. In spite of the weaknesses in the administrative procedures, there seems to be no recourse against them either. The Administrative Procedures Act does not apply to the Walsh-Healey Act. All this because, as the secretary says in the aircraft determination, "it must be borne in mind that these determinations apply only where employing subject themselves to them on a voluntary contractual basis."

Or, in plain language, if you don't like to sell your B-36 to the U. S. government, why don't you try to sell it to the ARP?

▶ **What Next?**—Industry feels that the aims of the Walsh-Healey Act have been fully accomplished. It holds that when the Act was passed in the summer of 1936 there was a real danger that sweatshop conditions might return to plague labor and fair employers alike. The NRA had been repealed and the Fair Labor Standards Act had not yet been passed.

The broad advance of labor since 1936 and the passage of the Fair Labor Standards Act give assurance that sweatshops are gone for good. Industry holds therefore that the Walsh-Healey Act is unnecessary and that its present use as a vehicle for wage increases is against the spirit of the law.

Industry opinion is opposed by the Department of Labor which holds that it was "the policy of the Congress in enacting the Public Contracts Act to prevent government business from going to bidders with wage practices which are substandard for the particular industry." The department feels that it must continue to eliminate such "substandard practices" as long as the law is on the books.

Only the Congress can decide this conflict.

But as long as the Walsh-Healey Act is one of the laws of the land all those interested in good government should put all possible pressure on the secretary to announce clearly and unequivocally the factors on which he bases his determination.

To protect the secretary from accusations of arbitrariness and capriciousness these factors could and should be developed through a joint government-industry-labor committee working under the auspices of an impartial authority on administrative procedures. The same committee could be used to develop proper definitions of "locality" and "minimum" and to establish guiding lines for determining when a minimum "prevails".

Munitions Board Reorganized

The Munitions Board has been reorganized. New plan regroups all offices having primarily industrial aspects under a Director of Production Management. All functions concerned with procurement and distribution are placed under a Director of Supply Management.

The Production Management Directorate, scheduled to be headed by a civilian "with wide industrial experience," is currently headed by Maj. Gen. A. R. Quinton, USA. He will become military advisor to the new civilian head.

Offices now included under Production Management are: Production planning; materials resources; construction and manpower. Secretariats of the Munitions Board on aircraft, petroleum and electronics have become divisions under the newly created division of Production Management.

The post of director of military supply is abolished. Rear Adm. Morton L. Ring, USN, who had been director of that office has been named director of supply management. He will supervise: office of procurement methods; office of distribution methods, and the standards, materiels, inspection, and cataloging agencies.

Brig. Gen. E. C. Langmood, USAF, former director for military programs, a post which was abolished under the reorganization becomes assistant director of the staff.

Silvaire Deliveries

Luscombe is setting up its Dallas production lines to handle a first run of 50 Silvaires and is scheduling deliveries to begin next month.

Initial output will be confined to two side-by-side models—the 90-hp. Silvaire Deluxe, priced at $3695 f.a.f., and a stripped Economy Silvaire, at $2650 f.a.f., for which the customer will furnish his own engine. Both models will have flaps and a new swinging engine mount as standard equipment.

▶ **Flap Kit**—The company is making a new wing flap kit available to owners of metal-wing Silvaires. Price is given as $300. According to Luscombe, installation of flaps will permit the following performance: 35-mph. power-on stalling speed (an 8-10 mph. reduction from previous figures), and ability to land in 450 ft. or less over a 50-ft. obstacle. Figures are based on a plane gross weight of 1400 lb.

The newly reorganized firm (AVIATION WEEK May 1) still considers the four-place Silvaire Sedan to be an active project. But decision to reactivate production on this model is being held up until next year so study may be made of possible design changes and market potential.

Airframe Shipments

Shipments of complete aircraft, measured in airframe weight, amounted to 3,854,100 lb. in April, 1950, according to the Bureau of Census and Civil Aeronautics Administration. U. S. military procurement accounted for 89 percent of the total volume.

April shipments of civil aircraft amounted to 329 planes valued at $6.4 million compared with March shipments of 321 aircraft valued at $5.7 million. The report covers 36 aircraft companies operating 41 plants and 12 engine companies presently operating 14 plants.

Aircraft engines shipped in April totaled 4,185,000 hp., with military procurement accounting for 96 percent of this horsepower.

April employment of 164,998 personnel in airframe plants was slightly higher than the 162,846 employment figure for March. April employment in aircraft engine plants, at 40,472, showed an increase of 200 employes over the March employment figure reported at 40,727.

MILITARY CONTRACTS

AF Contracts Total $240 Million

The Air Force awarded contracts in April totaling more than $240 million to about 800 companies. Majority of the contracts, 635, were on a fixed price basis, but aggregated only $24,090,358. Cost plus fixed fee awards, while numbering only 45, totaled $88,302,009.

Following is a partial list of April Air Force contracts. Other lists will appear in subsequent issues. The estimated completion dates of the contracts are given where available.

AC Spark Plug div., General Motors Corp., Flint, Mich., type LA-47 spare plugs for overhaul and maintenance, Sep., 1950, $8250; turntable—providing turning rates 1, 40, 120 min clockwise and counterclockwise, engineering and maintenance data, Oct., 1950, $16,848.

Acme Industrial Co., Chicago, 500 mazepoints, June, 1950, $3164.

Acme Visible Records, Inc., Cincinnati, visible file stands, May, 1950, $3582; visible file cabinets, May, 1950, $9850.

Addressograph-Multigraph, Dayton, cabinets, July, 1950, $4604.

Adel Precision Products Corp., Burbank, Calif., valve assembly, June, 1950, $11,388; fuel pumps, June, 1950, $7620.

Advance Equipment Co., Cincinnati, electric wire rope hoists and electric chain hoist suspension, Oct., 1950, $20,852.

Aero Instrument Co., Cleveland, airspeed type pitot tubes, Oct., 1950, $9514.

Aero Service Corp., Philadelphia, aerophotographic relief valve, Dec., 1950, $41,000.

Aero Supply Mfg. Co., Corry, Pa., aircraft hardware, Nov., 1950, $16,787; aircraft bolts, Dec., 1950, $4816.

Aero Supply Mfg. Co., Erie, Pa., aircraft bolts, July, 1950, $13,928.

Aerojet Engineering Corp., Azusa, Calif., additional work in connection with rocket engine test facility, June, 1951, $1,556,473.

Aeronca Aircraft Corp., Middletown, Ohio, spare parts for the L-16 aircraft, July, 1950, $26,597; crew chief stands, May, 1951, $12,718.

Aeroproducts div., General Motors Corp., Dayton, additional vibration survey of the Aeroproducts A-122-B2 propeller on the XC-124 aircraft, Oct., 1950, $8446; propeller blades, tools, spare parts, etc., for T-34 aircraft, Nov., 1951, $141,012; materials and services to fabricate hub, Feb., 1951, $16,338.

Aeroquip Corp., Jackson, Mich., hose assemblies, July, 1950, $25,858.

Air Accessories, Inc., Fort Worth, Texas, tail bearings, July, 1950, $10,500.

Air Associates, Teterboro, aircraft hose, July, 1950, $18,798; fasteners, Sep., 1950, $14,620; aircraft hose, July, 1950, $7,734.

Air Cruisers Co., Clifton, N. J., life rafts, June, 1950, $7192.

Air Speed Tool Co., Los Angeles, T-4 large portable pneumatic drill, Sep., 1950, $11,940.

Aircooled Motors, Inc., Syracuse, N. Y., spare parts for 0-235-C, 0-425-C, E-5A and E-5B engines used in H-13, L-13 and H-23 aircraft, June, 1950, $16,000.

Aircraft Hdwe. Mfg. Co., Buffalo, N. Y., aircraft bolts, July, 1950, two contracts, $2274, $12,911; aircraft bolts, Aug., 1950, $7557.

Aircraft Tools, Inc., Los Angeles, pneumatic portable direct shaver, Sep., 1950, $17,480.

Airequipment Co., Burbank, Calif., type D-1 maintenance stands, Nov., 1950, $192,470; type D-1 maintenance stands, Jan., 1951, $10,745; aircraft engine propeller tank, Dec., 1950, $18,682; maintenance stands, Jan., 1951, $22,582.

Allegheny Ludlum Steel Corp., Pittsburgh, casting and forging alloys with lower content of critical metals, Apr., 1951, $20,889.

Allison div., General Motors Corp., Indianapolis, J33 spare parts, Apr., 1950, two contracts, $521,880, $526,000; maintenance and overhaul spare parts required to support J33 jet engines installed in F-84, F-89 and B-45 aircraft, Jan., 1951, $466,000; maintenance and overhaul parts for J35-A-13 turbojet engine accessory items, Jan., 1951, $400,000; materials and services necessary to perform 150-hour test run on the 400-D1 jet engine, Sep., 1950, $12,288.

Aluminum Co. of America, Washington, D. C., extruded aluminum alloy, July, 1950, $18,457.

American-Coleman Co., Omaha, Neb., field testing tractors, spare parts data, Jan., 1951, $1,596,372.

American Phenolic Corp., Chicago, development and fabrication of multi-matched assembly discriminators for automatic navigation apparatus, June, 1951, $38,882.

American Time Products, Inc., New York, unit hermetic tachometer calibration testing type TC5A, Aug., 1950, $5210.

Anson div., General Aniline and Film Corp., Binghamton, N. Y., photographic paper (Anscolor Negative), Sep., 1950, $6798.

Antioch College, Yellow Springs, O., extra-low-temperature survey—obtain body temperature measurements of Air Force flying personnel, environmental conditions of the data and report, June, 1951, $22,624.

Arc Corp., St. Louis, completion of AF-2 Facility, June, 1950, $20,000.

Atlas Tack Corp., Fairhaven, Mass., brazing and braze alloy, Feb., 1951, $[illegible].

Bachman Wholesale Co., Rochester, N. Y., clamps, May, 1950, $10,000.

Bales Research Labs., Memphis, study of moisture content from cotton air, Apr., 1951, $[illegible]; determination of temperature, humidity effects on effectiveness of insecticides, plant to operate, Apr., 1951, $[illegible].

Barden Corp., Danbury, Conn., bearings, Aug., 1950, $73,200.

Barrett Equipment Co., St. Louis, accessory tooling and installation pedestal and maintenance data, July, 1951, $[illegible].

Batavia Mills, Inc., New York, [illegible] fabric, July, 1950, $[illegible].

Beaumont Crandall, Inc., Newton, Conn., Mk. aircraft assembly, Oct., 1950, $[illegible].

Beech Aircraft Corp., Wichita, Kan., T-11 and C-45 spare parts, June, 1950, two contracts, $18,510, $46,000; T-11 and T-34 spares, June, June, $112,110; field service, [illegible]; T-11, T-34, Aug., 1950, $[illegible].

Bell and Howell Co., Chicago, Eyemo Fast Motion Picture equipment, Sep., 1951, $[illegible]; camera parts B-29 aircraft, June, 1950, $[illegible]; [illegible] photographic equipment (Eyemo Short Focus), June, 1951, $[illegible].

Bell Aircraft Corp., Buffalo, N. Y., spare parts for H-13 and H-47 aircraft; spare parts for H-13, June, 1950, $[illegible]; spare parts for H-13 aircraft, June, 1950, $[illegible].

Bendix Aviation Corp., Eclipse div., Hollywood, Calif., [illegible] equipment, Feb., 1951, $[illegible]; [illegible] equipment, Feb., 1951, $[illegible].

Bendix Products div., Bendix Aviation Corp., South Bend, Ind., [illegible], June, 1950, $[illegible]; spare parts for [illegible] aircraft, June, 1950, $11,434; [illegible] and spare parts for [illegible] aircraft and engines, Feb., 1951, $[illegible]; [illegible] system, July, 1951, $[illegible]; [illegible] system, Feb., 1951, $[illegible].

Bendix Radio, Baltimore, [illegible] components for radio compass AN/ARA-8, Feb., 1951, $[illegible]; [illegible] power transformer, Aug., 1950, $[illegible]; [illegible] assembly, July, 1950, $[illegible]; [illegible] and maintenance spare parts, July, 1950, $[illegible].

Bendix Westinghouse Automatic Air Brake, Elyria, O., spare parts for [illegible], Nov., 1950, $[illegible].

Blakeslee, G. S. and Co., Chicago, development, vapor type, Nov., 1950, $14,522.

Boeing Airplane Co., Seattle, spare parts for B-29 aircraft, July, 1950, two contracts, $[illegible], $[illegible]; spare parts for B-17, B-29, B-50 and C-97 aircraft, Feb., 1950, $2,181,[illegible]; spare parts for B-50, July, 1950, $[illegible]; spare parts for B-47, July, 1950, $[illegible]; modification of B-50's equipment to [illegible], modification of B-50's equipment to [illegible] same by full contract conditions, no [illegible] date, $[illegible]; modification of B-50D equipment into receiver [illegible] of B-50D equipment into receiver [illegible] of B-50D airplanes to estimated completion date, $[illegible]; kits for modification of spare power packages and B-50D [illegible], May, 1950, $[illegible]; extension of [illegible] of B-50D airplanes, Mar., 1950, $[illegible]; maintenance time for B-50A airplanes, 45-[illegible] [illegible] AMC flight [illegible] and flight tests [illegible] to secure pilot [illegible] date, Apr., 1950, $[illegible]; extension of maintenance time for C-97C, extension of maintenance time for B-50D airplanes with AMC flight [illegible] and B-50D airplanes with [illegible] flight tests, Mar., 1950, $[illegible]; [illegible] parts to [illegible] [illegible] for B-50 airplanes, Mar., 1950, $[illegible]; [illegible] for B-29, Aug., 1950, $1,546,[illegible]; [illegible] kits for [illegible] of [illegible] [illegible] to [illegible] [illegible] to [illegible] [illegible] Sep., 1950, $[illegible]; spare parts and kits for [illegible] of MCR-1D as authorized B-50 [illegible] of MCR-1D as authorized B-50 [illegible], Nov., 1950, $[illegible]; modification kits to [illegible] [illegible] spare parts for [illegible] and [illegible] [illegible] [illegible]

Civil Aeronautics Administration, Washington, D. C., ceiling and visibility measuring equipment, Apr., 1950, $12,500.

Clapp Instrument Co., Webster, Mass., panel mounting low pressure oxygen gage, Dec., 1950, two contracts, $7959, $9916.

Clark Metal Products, Inc., Fairfield, Conn., dehydrator plugs, July, 1950, $26,000.

Cleveland Steel Barrel Co., Cleveland, metal shipping containers, Aug., 1950, $6680.

Collins Radio Co., Cedar Rapids, Iowa, to determine the heading of aircraft with respect to the sun by means of a microwave airborne radiometric sextant, Oct., 1951, $80,000.

Commercial Metal Products Co., Philadelphia, steel shipping containers, July, 1950, $2858.

Connecticut Telephone Electric Corp., Meriden, Conn., central group telephone GTA-1, June, 1951, $1,104,841.

Conray Products Co., New York, compound, Aug., 1950, $5931.

Consolidated Vultee Aircraft, Ft. Worth, modification of XB-36 plane, Nov., 1950, $65,991; B-36 spare parts, special tools, training data, parts and equipment, no estimated completion date, $23,138,416; maintenance or rework technical order compliance of other services necessary to place in A-1 condition G E K K-1 bombing navigational systems, June, 1950, $50,000.

Continental Electric Co., Newark, N. J., spare parts for C-1II powerplants, Nov., 1950, $7985.

Continental Motors Corp., Muskegon, Mich., spare parts for 0-470-7 engines used in L-17 aircraft, June, 1950, $33,182; spare parts for 0-190-1, 0-205-1 and 0-470-7 engines used in L-16A, L-16B and L-17 aircraft, June, 1950, $24,493.

Cook Electric Co., Chicago, recording equipment, Aug., 1950, $39,790.

Cornell Aeronautical Laboratory, Buffalo, N. Y., flutter models, Nov., 1951, $156,433; development of a high temperature stable core dielectric and construction of missile radomes, Jan., 1951, $16,910.

Cox Stevens Aircraft Corp., Mineola, N. Y., navigation kits, July, 1950, $20,228.

Coxhead, Ralph C., Corp., Dayton, typewriters, May, 1950, $25,197.

Cramer, R. W., Co., Centerbrook, Conn., time delay relay, July, 1951, $5984.

Curtiss-Wright Airplane div., Curtiss-Wright Corp., Columbus, O., reconditioning of B-29A aircraft, Mar., 1951, $1,800,000.

Curtiss-Wright Propeller div., Curtiss-Wright Corp., Caldwell, N. J., B-36 propeller spare parts, Dec., 1950, $52,371; propeller equipment, June, 1951, $157,048; propellers, spinners and controls, Dec., 1951, $2,600,000; design, development, fabrication and delivery of one set propeller vibration equipment and propeller, Apr., 1951, $97,000.

Dallie Screen Co., Chicago, miscellaneous photographic spare parts, June, 1950, $5206.

Daver Co., Dayton, sound level meter and analyzer, Apr., 1951, $5800.

Davies-Young Soap Co., Dayton, hydraulic fluid, July, 1950, $8722.

Dayton Blue Print Co., Dayton, photographic bristol board, June, 1950, $2581.

Defrenes Co., Philadelphia, motion picture training films, Sep., 1950, $46,418.

Delco Products div., General Motors Corp., Dayton, motor assembly 24v dc ⅛ hp, July, 1950, $20,920.

Delron Co., Los Angeles, nuts, June, 1950, $34,192.

Department of Commerce, Washington, D. C., dual ground transponder distance measuring equipment, Mar., 1951, $59,552.

Diamond Metal Products Corp., Harrisville, Pa., containers, parts, covers and clamps, July, 1950, $18,193.

Dill Mfg. Co., Cleveland, valve, Sep., 1950, $36,254.

Ditto Inc., Dayton, duplicating machines, July, 1950, $13,578.

Superintendent of Documents, Washington, D. C., publications, Apr., 1950, $5000.

Douglas Aircraft Co., Long Beach, Calif., factory familiarization training, July, 1950, $10,120; spare parts for maintenance of C-74 aircraft, Oct., 1950, $10,000.

Douglas Aircraft Co., Santa Monica, Calif., outer wing panel, sling assembly, July, 1950, $5286; maintenance spare parts for B-26 aircraft, Dec., 1950, four contracts, $125,000, $50,000, $145,000, $150,000; spare parts for B-26 and C-74 aircraft, June, 1950, $51,292; maintenance spare parts for B-26 and C-74 aircraft, Dec., 1950, $500,000; spare parts for Air Force Reserve C-47 aircraft, June, 1950, two contracts, $15,000, $22,218; maintenance spares for the C-47 and C-54 type aircraft, June, 1950, two contracts, $100,000, $16,261.

Dupont, E. I., de Nemours Co., Wilmington, Del., photographic film, Sep., 1950, $209,218.

Durham Aircraft Service, Inc., Woodside, N. Y., overhaul O-type aircraft engines and their accessories, July, 1950, $95,000.

Duroux, Joseph W., Chicago, manuscript on armament sciences, Sep., 1950, $7500.

Dye Oxygen Co., Phoenix, breathing oxygen, Sep., 1950, $2828.

Dynamic Air Engrg., Inc., Los Angeles, blower assembly, Aug., 1950, $6136.

Eastman Kodak Co., Rochester, N. Y., photographic film, May, 1950, two contracts, $10,227, $3809; photographic film, Sep., 1950, $5061; photographic film and paper (Aviation Navy), June, 1950, $28,862; photographic film and paper, June, 1950, $3256.

Eastman Kodak Stores, Inc., Washington, D. C., photographic spare parts, July, 1950, $4100.

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, F-1 and F-2 automatic pilot, Nov., 1950, $36,219; aircraft engine driven generator spare parts, Dec., 1950, $118,312; yoke and field assemblies, Dec., 1950, $25,480; boost controls and spare parts, Dec., 1950, $191,015; inverters, Mar., 1951, $90,448; fuel pressure transmitters, Mar., 1951, $149,121; indicator and transmitter assemblies, Aug., 1950, $24,061; oil separators, Oct., 1950, $2871.

Eisner, Sigmund, Co., Red Bank, N. J., camp shirts, trousers, Feb., 1951, $177,961.

Elastic Stop Nut Corp. of America, Union, N. J., nuts, July, 1950, $5965.

Electric Auto-Lite Co., Toledo, O., lamp assemblies, Aug., 1950, $4858.

Electric Sprayit Co., Sheboygan, Wis., compression air motor assembly and maintenance data, July, 1950, $5786.

Electronic Associates, Inc., Long Branch, N. J., floating board model, Nov., 1950, $34,239; spare parts for model 122 Analyzer, Aug., 1950, $5437.

Electronic Brazing Co., Montclair, N. J., gyro magnetic compass flux transmitter, June, 1950, $6122.

Ericson Mfg. Co., Cleveland, connectors, June, 1950, $3541.

Fafnir Bearing Co., New Britain, Conn., ball bearing, July, 1950, $25,938.

Fairchild Aircraft div., Fairchild Engine and Airplane Corp., Hagerstown, Md., kits to install stainless steel conduit for propeller wiring, Aug., 1950, $10,172; spare parts for C-82 aircraft, June, 1950, $1308.

Fairchild Camera-Instrument, Jamaica, N. Y., major components for radio compass, July, 1951, $1,111,188; mechanical time fuze and remote control system, Nov., 1950, $17,611; remote ring indicator subassemblies, Dec., 1950, $23,888.

Federal Aircraft Works, Minneapolis, skis, July, 1950, $8877.

Federal Motor Truck Co., Detroit, spare parts for C-2 truck tractor, Sep., 1950, $15,022.

Federal Prison Industries, Inc., Washington, D. C., waste receptacles, Aug., 1950, $1800.

Bureau of Federal Supply, Cleveland, hose and clamp cabinets, June, 1950, $1100; wood cabinets for tool storage, July, 1950, $150,000; office equipment, June, 1950, $122,190.

Fine Organics, Inc., New York, carbon remover, June, 1950, $28,222.

Firestone Indus. Prod. Co., Akron, synthetic rubber sheet, July, 1950, $1070.

Firestone Tire and Rubber Co., Akron, airplane casings and tubes, July, 1950, $92,042; airplane casings, Sep., 1950, $1500,000.

Firth Sterling Steel Co., McKeesport, Pa., steel tool bits, Aug., 1950, $5025.

Follansbee Steel Corp., Follansbee, W. Va., containers, July, 1950, $21,000.

Frampton Electric Equipment Co., Dayton, junction box J-30 A/C, Oct., 1950, $4177.

Frank and Warren, Brooklyn, N. Y., photographic spare parts, July, 1950, $13,637.

Franklin Institute, Philadelphia, manufacture, 10 channel spectrograph recording with spare parts, design data and handbooks, May, 1951, $73,655.

Navy Contracts

The Navy has announced a group of contracts in excess of $50,000, largest of which for $14,760,900 went to Pratt & Whitney Aircraft division of United Aircraft Corp. Other awards:

Ashland Oil & Refining Co., Ashland, Ky., 3,008,000 gal. aviation fuel, $367,527.

Atlantic Refining Co., Philadelphia, 900,000 gal. aviation fuel, $84,600.

Bell Oil & Gas Co., Tulsa, 3,508,000 gal. aviation fuel, $299,956.

Boonton Radio Corp., Boonton, N. J., 100 signal generators, spare parts, drawing handbooks, $110,179.

Chicago Industrial Instrument Co., Chicago, voltmeters, $200,567.

Cities Service Oil Co., New York, 50,405,000 gal. aviation fuel, $8,094,830.

Douglas Oil Co. of Calif., Paramount, 2,143,500 gal. aviation fuel, $376,328.

Eclipse Pioneer div., Bendix Aviation Corp., Teterboro, 1319 oxygen regulators, $238,526.

Esso Standard Oil Co., New York, 75,455,000 gal. aviation fuel, $11,480,842.

Gulf Oil Corp., Pittsburgh, 12,756,092 gal. aviation fuel, $1,988,753.

Hartzell Propeller Co., Piqua, O., 65 club propeller, test assembly, and drawings, $119,528.

Humble Oil & Refining Co., Houston, 17,777,124 gal. aviation fuel, $3,089,996.

Jack & Heintz Precision Industries, Inc., Cleveland, 324 inverters and spare parts, $162,916.

Magnolia Petroleum Co., Dallas, 10,989,968 gal. aviation fuel, $1,020,621.

Marvel Mfg. Co., Caldwell, N. J., 22 propeller balancing kits, stand assemblies, $66,529.

Phillips Petroleum Co., Bartlesville, Okla., 75,299,000 gal. aviation fuel, $10,784,828; 890,000 bbls. 72 octane motor fuel, $1,488,942.

Pontiac Refining Co., Corpus Christi, 322,000 bbls. automotive gasoline, $1,041,756; 13,430,000 gal. aviation fuel, $2,052,190.

Pratt & Whitney div., United Aircraft Corp., East Hartford, Conn., engines, $14,760,900.

Richfield Oil Corp., Los Angeles, 420,000 bbls. automotive gasoline, $2,010,960; 98,648,500 gal. aviation fuel, $12,160,514.

Roosevelt Oil & Refining Co., Mt. Pleasant, Mich., 801,500 gal. aviation fuel, $88,165.

Shell Oil Co., New York, 312,000 gal. aviation fuel, $62,205; 13,948,000 gal. aviation fuel, $2,211,174.

Sinclair Refining Co., New York, 22,007,000 gal. aviation fuel, $3,668,879; 3,360,000 gal. 72 octane motor fuel, $433,440.

Socony-Vacuum Oil Co., New York, 5,591,500 gal. aviation fuel, $862,402.

Standard Oil Co. (Calif.), San Francisco, 15,981,200 gal. aviation fuel, $2,041,509.

Standard Oil Co. (Ind.), Chicago, 13,720,000 gal. aviation fuel, $2,089,800.

Standard Oil Co. (Ky.), Louisville, 16,367,000 gal. aviation fuel, $2,523,722.

Standard Oil Co. (Ohio), Cleveland, 274,000 gal. aviation fuel, $35,507; 9,107,000 gal. aviation fuel, $1,440,200.

Tidewater Assoc. Oil Co., San Francisco, 56,363,000 gal. aviation fuel, $8,532,672.

Tidewater Assoc. Oil Co., New York, 2,238,000 gal. aviation fuel, $378,379.

Tulsa Municipal Airport, Tulsa, 805,000 gal. aviation fuel, $98,301.

Utah Oil Co., Salt Lake City, 2,142,000 gal. aviation fuel, $382,416.

White Tuning Corp., New York, 146 radio receiving sets, $83,951.

Wilshire Oil Co., Norwalk, Calif., 4,368,000 gal. aviation fuel, $677,479.

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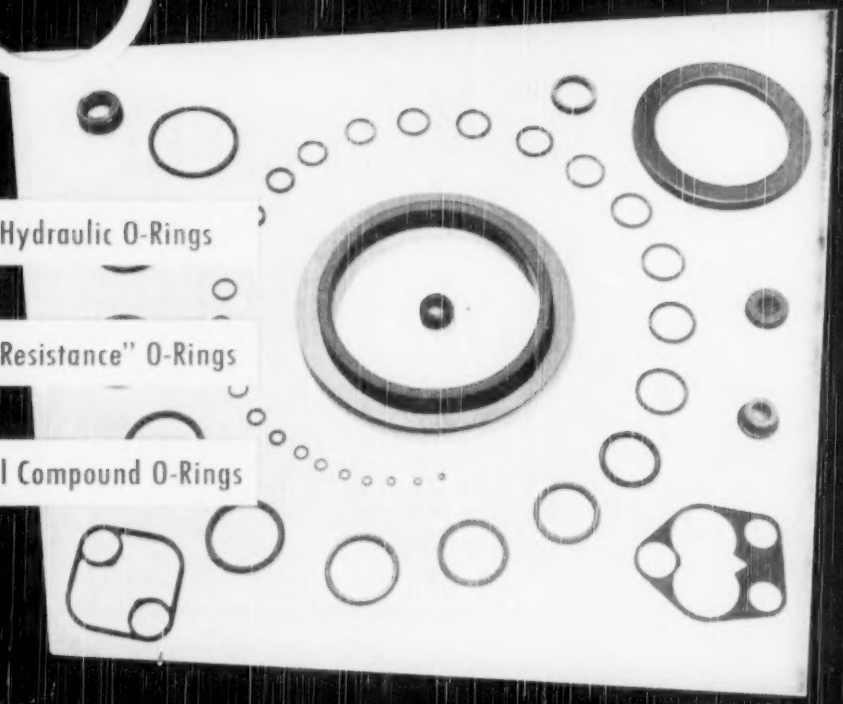

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- **Interdependence of groups in research and in design and the ever closer relation of these two activities means that the engineer must extend his knowledge into the field of his co-technician.**

By C. E. Pappas*

The brief spin of supersonic flight has added to the aeronautical engineering "structure" a new tier of complexities, with glaring gaps between what has been considered basic knowledge and concepts comparatively new to the field.

Aeronautical engineering has never been a "handbook" science. It will continue to present ever-increasing challenges, taxing the imagination and requiring a keen ability to apply newer knowledge to practical designs.

Since the field of aeronautics is ever-changing—and fast—new emphasis is mandatory in its many domains. Chief among these are:

- Education
- Avionics
- Powerplants
- Structures
- Aerodynamics

The order in which these activities are mentioned in no way indicates their relative importance, but rather they are the "building blocks" of what must be an integrated, overall aeronautical foundation.

▶ **Education**—The aeronautical engineer frequently finds himself unable to cope with the newer concepts that high-speed flight has brought. This condition arises because basic training in mathematics, physics, chemistry and many other key branches are noticeably lacking to meet the intricacies of the majority of aeronautical problems.

This deficiency already has been noted in industry and there is an increasing trend to hire men possessing what was formerly considered "abstract knowledge." These personnel include mathematical and atomic physicists, physical chemists, and even astronomers.

There is a need for revaluation of education in preparation for the aviation industry. With the unfolding ramifications of the aeronautical future, technicians now contend that the aeronautical engineer is too much of a "limited specialist," that his basic training before entering industry should be along lines of general science.

This, they insist, will render him infinitely more "flexible" in the general aeronautical picture. Though there is growing evidence of specialization—even within specialization—a "fundamentally educated" engineer will have a keener appreciation of problems related to his specialty.

It will be argued that a person who has acquired such fundamental or intensive training may become so involved in exacting details that he will forget the practical application of his science to a particular problem. This can be overcome to a large extent if, after four years of training in the basic subjects, he is subjected to actual engineering problems in various fields in his fifth year.

This, of course, advocates a five-year training program in place of the customary four-year course but this additional year is necessary for the student to gain an appreciation and regard for the required balance of judgment between science per se and the application of it to a specific problem.

And in industry, recurrent inter-group training within the plant to increase overall flexibility and build the morale of the engineer will undoubtedly be a "must" in the aeronautical future.

▶ **Avionics**—The general field of electronics, as applied to aircraft, has progressed so rapidly within the last decade that its advance has far outstripped the efforts of the average engineer to keep up with it.

This is a condition which can seriously affect design progress. It can no longer be ignored, because basic design of the aircraft is a function of the capabilities of the electronic equipment and vice versa.

Hence, the aircraft manufacturer must simultaneously coordinate the activities of the development of electronic equipment with the aerodynamic characteristics of the plane, to achieve greatest practical utility.

This means that design personnel must have more than just a superficial knowledge of electronics and its application potential.

Thus, high speed alone is meaningless for combat craft unless equipment carried can be made to supplement this characteristic effectively. A pilot flying at high speed is confronted with a rate of closure so great, that he will be unable to place the target in his sights. Without equipment to give him ample advance warning, his speed advantage will prove of no practical value.

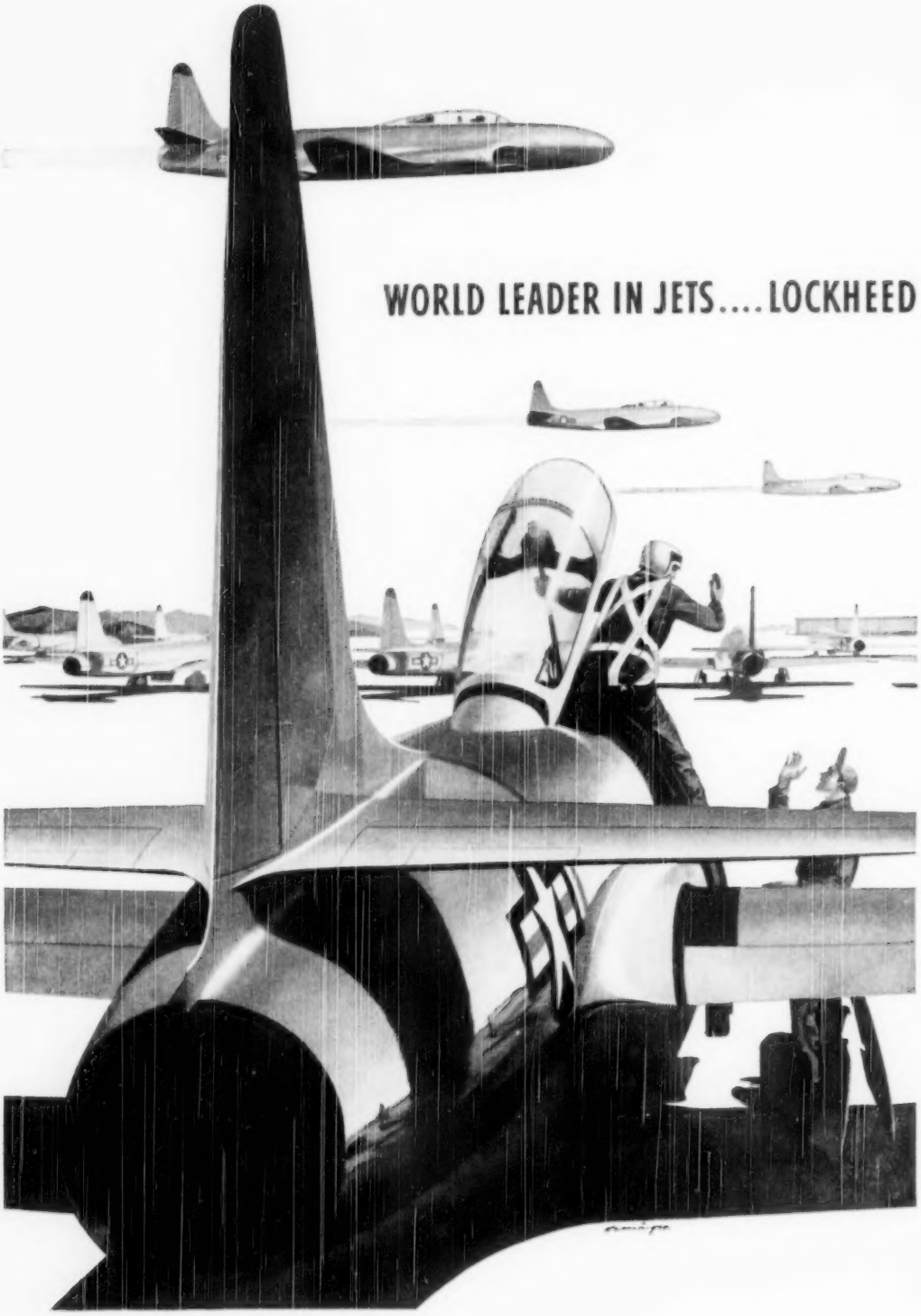
Also, electronics and basic design of miscellaneous controls must be tied in together in such a manner that the design engineer must have a clear knowledge of electronics as well as mechanical systems in the high speed regime where instantaneous mechanical assumption of controls will be a prime factor. This will be necessary to cope with malfunctioning of highly intricate devices or the possibility of enemy jamming.

Since the degree of simplicity and ruggedness required for electronic equipment will depend upon the rigors of the service, the design engineer will need more than just a familiarity with these automatic devices to coordinate intelligently basic control problems with the avionic expert.

▶ **Powerplant vs. Airframe**—Does engine development lag aerodynamic progress, or vice versa? This controversy—peculiar to aeronautics—is where technicians toss brickbats at their fellows in opposing camps.

The engine designers look the airframe

*Chief of Aerodynamics, Republic Aviation Corp. Our text is from Dean Pappas's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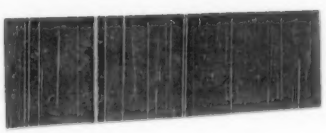


trame men by surprise when they added, almost overnight, approximately 200-300 mph. to the speed of what already were considered "hot" military aircraft.

But it was not long before the airframe designers complemented this new jet power with efficient and adequate fuselage and wing configurations.

Now, impartial observers say, "This is where I came in."

The aerodynamicists still feel the jet does not answer the problem because of its size (particularly in the higher rating class), specific fuel consumption, and more flow characteristics.

All these items make the aircraft much larger than aerodynamicists desire. This in turn, creates a need for still larger powers, and here we go round in circles again.

Aerodynamicists maintain that to fly at an altitude of 40,000 ft. at a speed of M = 1.5, static sea level rating of the engine would be of the order of 50,000-lb. thrust. This means the incentive ducts to carry the necessary air flow.

The engine men may answer that they never have seriously contemplated a jet engine of this power. They probably feel that the answer lies in a different type of powerplant—possibly a combination of jet and turbo or possibly rocket power. Though this latter power medium has demonstrated its potential in research craft, much more must be learned about it operation wise and its fuel consumption improved for combat service if its utility is to approach that of the engines in today's military craft.

While development of an "ideal" fuel would go far to bridge the engine-airframe controversy, the situation now emphasizes that a keener appreciation of engine problems is needed by the aerodynamicist, and that the engine man must realize more fully the problems confronting the high-speed plane designer.

For truly high speed designs, the knowledge of these two technicians must be merged either by exceptionally close liaison or in the form of a single specialist with intensive training in both fields. If aeronautical progress continues at the present tempo, this approach must be the necessary one to save.

▶ **Structures**—New perplexities are here to plague the structural analyst. These are not routine problems, but will require special techniques and more refined mathematical approaches not generally considered previously.

Example: The delta wing presents new difficulties in that the chord and span are of comparable dimensions, and as such, the interdependence of these two dimensional factors can no longer be neglected.

And special analysis is required to determine stress distributions at the root junction of a swept-back wing, since the conventional distributions no longer apply. This has been disclosed in experiments showing that stresses at the root-spar rear-root junction can be as many times that at front spar.

Thicker skin gages will require more exacting stress analysis. Here, the so-called secondary effects, such as the elastic restraint offered by spars and ribs and the interaction of these elements in defining the general stability of the wing cover, must be considered for an accurate prediction of ultimate strength.

This situation is considerably different from the conventional thin skin structure where every stringer is fastened and the primary loads are carried by concentrated areas such as spar caps and stringers. With the thick-skin structure, the covering must carry the primary shear and compression loading, and structural instability of free arrangement results in sudden and catastrophic collapse of the structure.

Since appreciable aerodynamic heating will occur in future high-speed craft at relatively low altitudes, we will have to include there the effects of temperature and time in the equations of structural equilibrium. Effects of temperature coupled with those of aeroelasticity will produce a new phenomenon—"aero-thermoelasticity"—to plague the designer.

▶ **Aerodynamics**—Transonic, supersonic and hypersonic flight will force the aerodynamicist to revise his thinking. Problems in these regimes do not lend themselves to conventional solutions found in the subsonic case.

In the transonic belt, the phenomena are, to a large extent, time dependent, and stability of the air flow shows no orderly trend. This implies that the changes in airflow as a function of Mach number are random in nature.

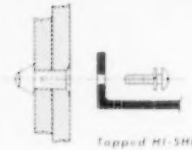
The engineer should, therefore, resign himself to the fact that "hard values" must be used in this regime and now he must give up the idea of precise determinations.

We now stand on a step of the aerodynamic ladder, which can best be described as "the rung of probability." A concept of statistical average for the values to be used in analyzing the transonic phenomena is necessary because of the random motions that are involved.

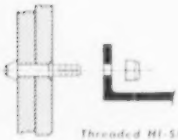
The degree of randomness depends to a large extent on the initial conditions at a given Mach number. For example, if an airplane were flying on level flight at, say M = .80, and accelerated to M = .95, the pilot would

REGULAR *hi-shears* save weight, time and space when fastening structure

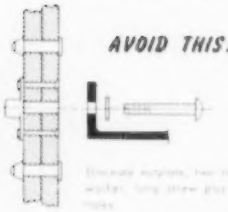
SPECIAL *hi-shears* fasten primary structure and provide attach means for removable elements



Tapped HI-SHEAR secures primary member. Screw and lockwasher secure detachable element to screw completes flush cross-section. Works in fin to surfboard structure.



Threaded HI-SHEAR stud, plus self-locking nut, provides single attachment. Multiple attachments permitted when structure is sufficiently flat.



Illustrate surplus, two rivets, washer, long screw plus two nuts.

other special HI-SHEARS

Cam — smooth stud — cross drilled head — Hi-Shear dowel pin — these special Hi-Shears have saved weight, time, space and point! Your problem may require a new approach. Send a sketch — we will supply price and samples.

THE *hi-shear* RIVET TOOL CO.
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experience certain reactions when he attains the end point of this speed.

However, if the airplane were to be disturbed from its initial equilibrium speed of M = .80 by executing a roll-off, the pilot's reactions would not necessarily be the same when he attained a speed of M = .95 as in the level flight case.

▶ **Physicist's Approach**—The notions of randomness and uncertainty are not new in other sciences. The modern physicist treats most of his problems in the kinetic theory of gases and atomic physics along the theory of statistical distributions and probability. He has given up the notion of trying to specify his quantities precisely.

The modern aerodynamicist should adopt this philosophy of the modern physicist.

▶ **Hypersonic Factors**—Problems are beginning to come up in which the aeronautical engineer can no longer assume that the air is a continuum. This is because ultra-high speeds will be attained at very high altitudes where the mean free molecular path is appreciable when compared with the physical dimensions of the body which is flying through the medium.

As such, the laws of aerodynamics that are now in current use are not applicable for the design of future high speed vehicles, particularly in the case of missiles.

It is imperative for today's aeronautical engineer to realize that to keep abreast of the field he must acquire a knowledge of some of the work of the modern physicist.

Such subjects as the theory of rarefied gases, statistical thermodynamics and molecular structure must be investigated. These subjects need to be understood, for example, before any intelligent answers can be obtained for the design of hypersonic tunnels. Since the tunnel pressures approach an absolute vacuum, the gas is rarefied. In this physical state, the ordinary thermodynamic formulas do not apply.

And shock waves will require more critical analysis. Thickness of the shock wave is extremely small—of the order of the molecular free path. Since molecular distances are involved, the conventional thermodynamic equations do not apply. Molecules possess translational, rotational and vibrational degrees of freedom. Because of the extremely short time involved for molecules to traverse the wave, thermal equilibrium may not necessarily be achieved.

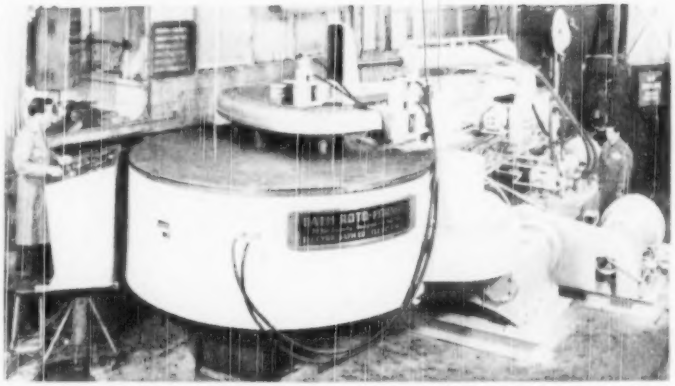
The translational and rotational degrees of freedom approach equilibrium very quickly in passing through the wave.

The change in vibrational mode requires a finite time to attain statistical equilibrium. This is known as the relaxation time. Allowance for this condition must be made in the energy equations when computing changes in pressure, density and entropy. This has not been usual practice.

These departures from conventional procedure indicate, in a small measure, how complexities in the field of aeronautics have increased in scope.

New designs will involve application of many new concepts. And these new concepts will require a broader familiarization with the many facets of applied science.

Aeronautics—it no longer a "specialized" study.



'TAFFY PULLER' SHAPES BOEING'S PARTS

Huge rotary stretch former is new addition to Boeing Airplane Co.'s production line in Seattle. Fifty-ton machine has enough muscle to stretch aluminum or stainless steel to its elastic limit, then curve it into desired pattern. Extruded or rolled sections up to 22 ft. long can be wrapped around die mounted on revolving circular table. Boeing will use machine to make structural components. Builder is Cyril Bath Co.

Balsa Dust Shows Rotor Flow Geometry

Inexpensive apparatus is developed by NACA for helicopter research.

Balsa wood and a belt sander have been combined by National Advisory Committee for Aeronautics to produce a new medium for the visualization of flow patterns around helicopter rotors.

Balsa, sanded to a fine dust, provides highly reflective particles of low mass which can be introduced into an airstream for airflow observation. The technique, and its applications, was presented in a paper by M. K. Taylor of Langley Aeronautical Laboratory at the semi-annual meeting of the American Society of Mechanical Engineers in St. Louis, Mo.

After toying with a number of indicating materials, including smoke, NACA found that finely-divided balsa particles gave the best combination of high reflectivity and low mass.

Balsa dust has a very prosaic background: it is born of a cross-grain sanding of select grade 1 balsa wood. The dust obtained is sifted twice through an 18-mesh screen.

Average free-fall velocity of these fine particles is about one fps. in air.

▶ **Simple Apparatus**—The equipment required for balsa dust flow visualization experiments is the dust, a camera, photographic lamps and some sort of dispenser for the dust.

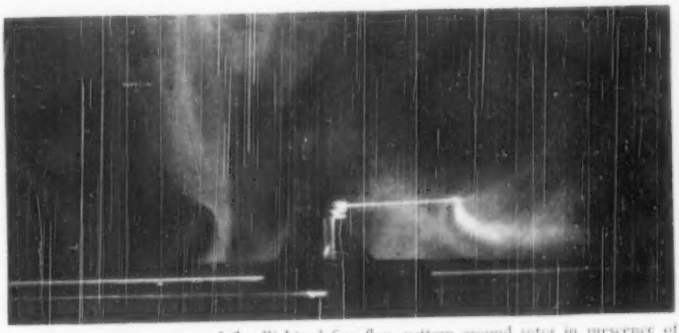
The NACA dispenser is a narrow trough with a screened bottom, filled with balsa dust. The trough is mounted about four feet above the plane of the rotor, and is agitated mechanically to disperse the dust.

A plane of high intensity light from a number of photographic spotlights is projected normal to the line of sight of either a still camera or a motion picture camera. The cameras, of course, are used to record the flow patterns.

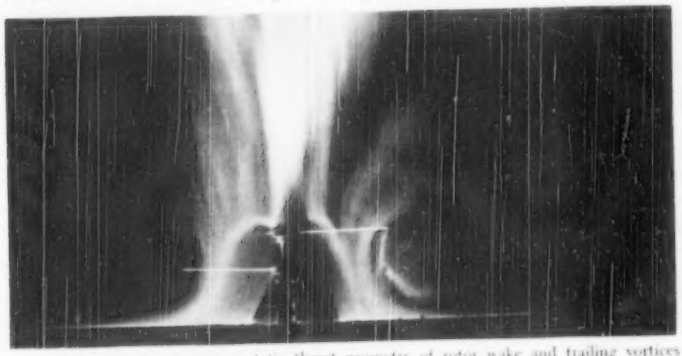
▶ **Rotor Details**—The model rotors tested in this group of experiments were single, coaxial and biaxial—a cross section of today's practice. As some idea of the sizes involved, the coaxial rotor was 20 in. in diameter, and the biaxial arrangement, 45 in.

Plane of the rotor was about five ft. above the floor; for simulated ground effect, ground planes were set at either 25 percent or 50 percent of the rotor diameter below the rotor plane.

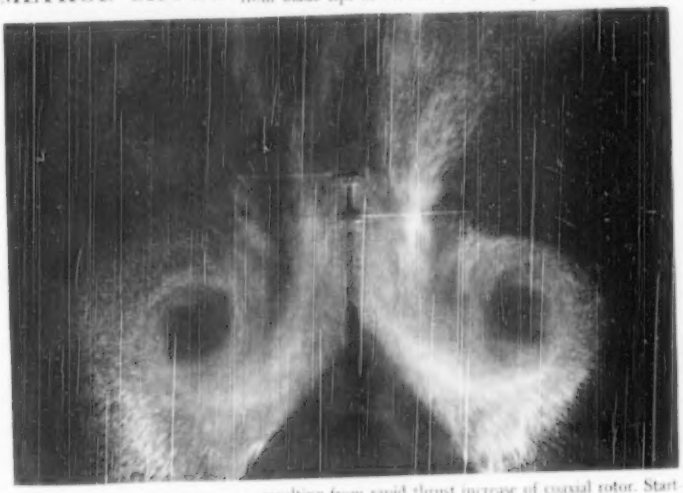
▶ **Test at Rest**—So far, then, the NACA's balsa dust method has been used to determine the flow geometry around model helicopter rotors in the static thrust regime, under conditions of both steady and transient flow.



BALSA DUST and floodlights define flow pattern around rotor in presence of simulated ground 0.25D below. NACA flow visualization . . .



METHOD SHOWS static thrust geometry of rotor wake and trailing vortices from blade tips of coaxial rotor. Balsa particles show . . .



FLOW GEOMETRY resulting from rapid thrust increase of coaxial rotor. Starting vortex pattern checks with full-scale tests.

It has been possible to make measurements of the wake below rotors, to detect and record flow instability, to assess the effects of the ground plane on flow patterns.

And it has all been done with a simple technique and inexpensive apparatus.

Britain's Freighter Queen Makes Debut

Design is conventional, gross is 105,000 lb., landing gear fixed.

Britain's top entry in the cargo aircraft field, the Universal Freighter built by Blackburn & General Aircraft Co., Ltd. has taken to the air for the first time.

This beefy craft is intended to fill the role of the standard, medium payload, short-haul cargo plane of the British air fleet.

▶ **Tail Ramp**—The Universal's configuration very generally follows that of the Chase and Northrop freighters in this country, although it is much larger. It has in common with these a massive, truck-like fuselage fitted with a loading ramp under the tail.

The Universal is Britain's first designed for the purpose all-cargo plane of any real size. Its 105,000 lb. gross weight is twice that of the Bristol Freighter.

This weight, coupled with a 162 ft. wing span, makes the Universal the second largest British landplane, exceeded only by the Bristol Brabazon eight-engine transport.

Design of the Universal is based on the need for a 170-225 mph. craft which can carry up to 15 tons of cargo (21 ton useful load) at low cost over relatively short distances and get in and out of fairly tight places.

While the Universal is Britain's largest air freighter, it is small compared to the largest American cargo plane, the Consolidated Vultee XC-99 which, with a 265,000 lb. gross weight and 230 ft. wing span, can carry a useful load of 67 tons over great distances at speeds exceeding 300 mph.

At least two other U. S. aircraft primarily designed to carry cargo, the Douglas Globemaster and Boeing Stratofreighter, are well ahead of the Universal in speed, payload and range.

▶ **Bush Freighter**—However, it is possible the Universal may prove to have some advantages in cargo loading utility. It also more nearly fits the classification of "bush freighter" with its short landing and takeoff ability. And it has been designed to operate even from bad fields. Takeoff run to clear a 50 ft. obstacle is estimated at less than 3000 ft. It is supposed to land over a 50 ft. obstacle in a little more than 2000 ft.

▶ **Mr. In-Between**—U. S. thinking on cargo planes seems to require two types: the long-haul, high capacity plane and a short-haul low-payload type. The British have the short-haul type in the Bristol Freight. But the Universal is a new class: a medium-payload, short-haul plane—in between the two categories familiar to this country.

The Universal's particular mission probably is to haul medium loads between trunkline centers and points served by the small cargo craft.

▶ **Load and Range**—It is estimated, according to the SBAC Standard Method, the Universal will carry a payload of 14.4 tons 250 mi. at a cost of about 12 cents ton-mile, 14.5 tons 500 mi. at 11 cents ton-mile, 10.75 tons 1000 mi. at 12½ cents ton-mile, and 7.25 tons 1750 mi. at 17½ cents ton-mile.

Loading mass in the craft are the main cargo hold, taking up the entire center section of the fuselage, a smaller compartment in the nose, below the cockpit, and additional space in the tail boom, to the rear and above the main hold.

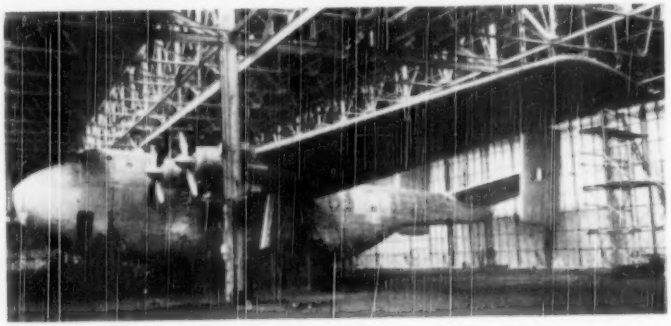
The main hold is 30 ft. long, 10 ft. wide, and 10 ft. high for the first 25 ft. from the forward end, with the remaining aft end having headroom of 15½ ft. Removable flooring with bracing is designed to support loads up to 325 lb./sq. ft. The nose compartment is 15 ft. long and 6½ ft. high. It has mounting provisions for a loading winch. This can be secured to the floor in the main hold, also.

The tail boom compartment has an average headroom of 6½ ft. and is fitted with a lavatory at the end.

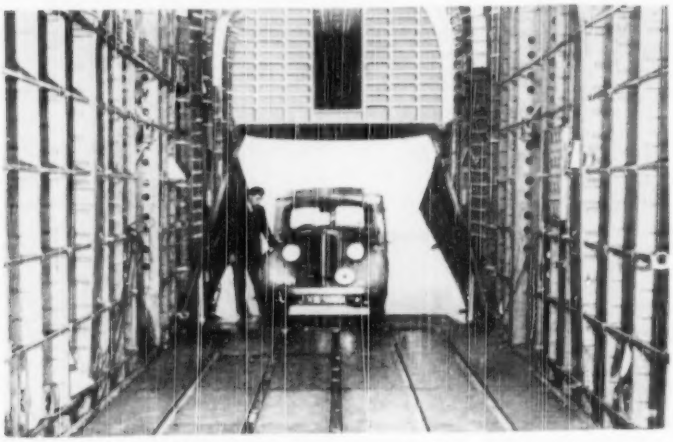
If light cargo is being carried, a removable deck can be fitted in the rear section of the main hold. This arrangement gives an upper compartment of 1850 cu. ft. which will carry a maximum of 30 passengers.

▶ **Transport Conversion**—The Universal can be converted into a 40 passenger transport by adding seats for 10 persons in the main hold, three on one side, two on the other. In this case, baggage is stowed in the nose compartment.

Passenger access to the upper deck is provided by a staircase at the forward end of the lower deck (main hold).



UNIVERSAL FREIGHTER'S upswept aft end has integral ramp. With ramp down . . .



UNOBSTRUCTED HOLD is easily loaded, accommodating vehicles, bulky cargo.

Freighter Data

Dimensions

Span	162 ft
Length	110 ft 2 in
Height	33 ft
Wing area	2916 sq ft
taper ratio	2.44:1
aspect ratio	9:1
dihedral	5½ min
sweepback	3½ deg

Weights

Empty	63,673 lb
Useful load	41,350 lb
Gross weight	105,000 lb
Maximum landing weight	100,000 lb
Wing loading	36.1 lb/sq ft

Performance

Top speed (at 3250 ft, alt, 75% rude	225 mph
Max. continuous cruising speed at 12,000 ft	216 mph
Max. economical cruise at 12,500 ft	180 mph
Recommended cruise, two engines out	135 mph
Rate of climb	520 ft/min
Stalling speed, flaps down (model)	73-85 mph
Takeoff distance to clear 50 ft obstacle	970 yd
Landing distance to clear 50 ft obstacle, reversible props	750 yd
Service ceiling, approximate	20,000 ft

Capacity

Total cargo volume	6761 cu ft
Total passenger capacity	90

There also is an external door high up on the left side of the plane near the tail which gives direct access to the upper compartment. Passenger entrance to the main hold is through a lower door on the left side, located just forward of the main landing ramp.

▶ **Loading Ramp**—The loading ramp is a thick, built-up structure consisting of a 11 x 9 ft main section and two trailing extensions which measure about 8½ x 7½ ft. When lowered the ramp has a slope of about 18 deg. When retracted, the main ramp closes up the bottom half of the loading access. The upper half of this opening is covered by access doors which also enclose the ramp extensions. These form catwalks to the spacious interior. Doors and ramps are operated by a separate, manually controlled hydraulic system.

▶ **Flight Deck**—The flight deck is designed for a crew of four and is split into two compartments. Entrance is through a floor well behind the pilot's seat which opens to a ladder in the nose cargo compartment directly below. Crew access to the ladder from the outside is through a lower door on the left side which opens into the forward cargo compartment.

Except for engine gages mounted on the center instrument panel, nose wheel steering pedals on the left side, and switches on the center console, all controls and instruments are duplicated for the pilot and copilot. Autopilot controls and instrument landing equipment are duplicated on the center console.

Normally, steering is done with the nose wheel steering pedals while controls are just locked. When locks are engaged, throttles cannot be opened all together beyond the taxing position, but they can be opened singly or in pairs to maneuver the plane.

▶ **Control Surfaces**—While elevator, aileron and rudder trim tabs normally are operated by control wheels located outboard of each seat, elevators can also be trimmed rapidly by electric push-buttons on the "V" shaped control yoke-in handles.

All flight controls are hydraulically boosted with only a small part of the load transmitted to the pilot. The boost ratio is reported to be as high as 10:1. Seats are stressed for forward accelerations up to 2.5 Gs.

In the aft compartment, separated from the cockpit by a bulkhead and curtain, the navigator and radio operator sit back-to-back in a double seat on the left side with a rest bunk opposite. The navigator's station is designed to provide for installation of cloud and collision-warning radar equipment.

▶ **Wing Structure**—The modified RAF 34 wing is built in four parts: two center sections carrying power plants, four fuel tags of 720 U. S. gal. capacity each, and flaps, and two outer panels carrying ailerons and designed to permit additional installation of two fuel bags in the wing.

A front spar is located at 23 percent chord and a rear spar at 55 percent.

Conventional construction is used with skin flush riveted forward of the front spar. Skin is stiffened here by a corrugated inner skin, while closely spaced stringers and round head rivets are used aft of the front spar. Majority of the ribs are the pressed flange type.

▶ **Slotted Flaps**—The two V44B NACA slotted flaps have a total area of 422 sq ft and are operated electrically. They are synchronized and are moved by a total of 6 actuators, each capable of exerting a force of 20,000 lb. The center actuator for each flap is directly driven by a 4-hp motor with the one on each side linked to the center unit by torque shafts.

▶ **Not Retractable**—The tricycle landing gear on the Universal is not retractable. Main wheels are secured by means of legs attached to the underside of the wing. These legs are braced by struts extending from the sides of the fuselage at the bottom. The nose wheel can caster through 120 deg and is turned by means of a Lockheed hydraulic steering unit which is powered by the craft's 2500 psi system. It is actuated by a cable system controlled by special pedals on the left side of the cockpit.

The Universal is powered by 4 Bristol Hercules 761 engines driving 14 ft. dia. Rotol four bladed, reversible pitch props. Engines are rated at 2000 hp. at 2800 rpm.

Landing Gear Fires Studied by CAA

A study to develop more exact data on landing gear fires and to establish the best procedures for handling these was undertaken recently by the Civil Aeronautics Administration Technical Development and Evaluation Center, Indianapolis.

It is the practice of some pilots, when confronted with such an emergency, to apply prop blast after the plane has come to a stop to control the flame until ground fire extinguishing equipment can be brought into play.

▶ **How Much Blast?**—Little has been known, however, about the air flow speed required for most effective results, how long prop blast can be safely used, and what other factors are involved—if any.

To find out, CAA set up a complete DC-3 landing gear in the fire test chamber at the Center, where the Lockheed Constellation XR60-1 powerplant installation is also undergoing fire tests.

The Pratt & Whitney R-4360, turning a 16-ft propeller, furnished the air blast for tests. A spark ignited hydraulic fluid flowing under 900 psi pressure at a rate of 2 gpm from a spray nozzle. The landing gear was located 18 ft aft of the prop and 21 in. to left of the centerline of the XR60-1 nacelle.

The investigation was divided into three parts:

- **Air flow measurements** adjacent to the landing gear.
- **Study of fire patterns** in connection with air flow.
- **Study of the durability** of a burning tire.

▶ **Measuring Air Flow**—The apparatus for measuring airflow at various points in the same plane as the strut consisted of a mounting bracket extending outward from the strut, to which were attached copper tubes for measuring air flow. The bracket could be raised to the full height of the strut. The tube ends were spaced at selected points outward and were pointed upstream to record total head pressures. They were

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connected to a multiple water manometer which was balanced against static air pressure in the test chamber.

Air flow readings were taken at each 6-in. level, from a height above the floor corresponding to the center line of the landing gear wheel to the full exposed height of the strut.

It was found that high speed air leaving the propeller moves rearward like a continuous cylinder having a slightly larger diameter than the prop. Outside the bounds of this cylinder, the air speed is relatively lower and in some areas reversed.

▶ **Firing Line**—On completion of the airspeed survey, another series of test, was conducted in which fires were ignited at various locations along the length of the strut. When the fire at the particular point under observation appeared to be under control, the air speed was noted. Flames were considered to be under control when they were reduced to a size that prevented damage to surrounding structure. (A "harnessed" fire looks like a large ball attached to the leeward side of the strut and fire.)

Airspeed required to control these fires ranged around 60 to 80 mph. The fire occasionally could be blown out when engine speed was increased to 2800 rpm. (140 mph. airflow speed at the strut).

▶ **Tire Test**—To determine how long an inflated tire could be subjected to this heat and remain intact, a wheel equipped with a tire and tube inflated to 47 psi. was set in an upright position on the concrete floor. The same hydraulic spray nozzle used in previous tests was attached to the rim of the wheel. When fluid flowing from the nozzle was ignited, the flames impinged on the rim, entered through holes near the center of the wheel, and enveloped nearly half the tire.

No air blast was used in this test, but a 15-mph. wind which was blowing at the time performed a similar function. The tire remained intact for 2 min. 16½ sec. Failure occurred near the bead of the tire and was accompanied by a definite explosion.

As a result of these tests, CAA engineers have concluded:

- **Average safe air speed** required to control landing gear fires is about 70 mph. at the gear.
- **Airspeed of 70 mph.** is easily obtainable with prop located directly ahead of landing gear.
- **Fires can be blown out** occasionally by a very strong blast of air.
- **Size of fire** determines length of time a burning tire can remain intact, but it can be expected to rupture within 2 to 3 minutes.
- **It is highly dangerous** for exposed personnel to approach any closer than 25 ft. to a burning tire prior to the time it explodes.

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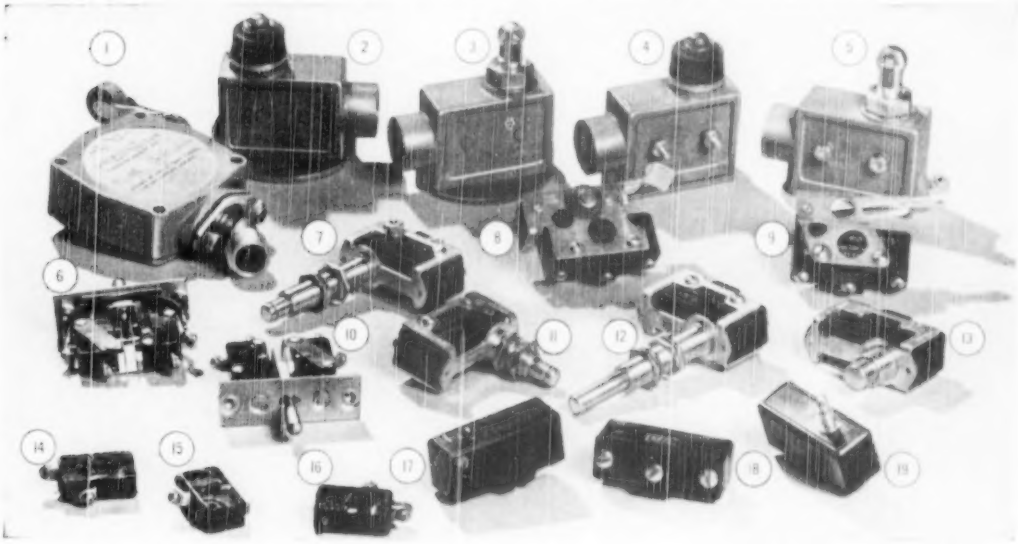

1 MICRO type LMR aluminum housing with rotary type roller arm actuator, supplied without switch enclosed, or with *AN3210-1* or *AN3216-1* enclosed, and with or without ground strap. Conforms to *AN3233-1, -2, 3, 4, 5* and *6*.

2 Lightweight, rugged, aluminum-housed switch with sealed plunger (MICRO BZV-7RNT1), bottom mount design, conforms to *AN3217-2*.

3 Aluminum-housed switch (MICRO BZV-7R99T1) with adjustable roller plunger actuator, bottom mount design, conforms to *AN3218-2*.

4 Lightweight, rugged, aluminum-housed switch with sealed plunger (MICRO BZE-7RNT1), side mount design, conforms to *AN3217-1*.

5 Aluminum-housed switch (MICRO BZE-7R99T1) with adjustable roller plunger actuator, side mount design, conforms to *AN3218-1*.

6 Momentary position two-unit toggle switch assembly for alternately opening and closing two circuits (MICRO LAT1). Conforms to *AN3235-1*.

7 Actuator bracket (MICRO MC2711R) conforms to *AN3168-1*. For use with single-pole double-throw basic switch (MICRO BZ-R31) which conforms to *AN3210-1* or with split contact double-throw switch (MICRO BZ-3YT) which conforms to *AN3216-1*.

8 Lever arm actuator bracket that has provision for resetting the basic switch while actuator arm is depressed (MICRO 9-10762LH). Conforms to *AN3170-2*. Right-hand design (MICRO 9-10762RH) conforming to *AN3170-1* also available. For use with MICRO basic switches BZ-R31 and BZ-3YT, which conform to *AN3210-1* and *AN3216-1*, respectively.

9 Roller lever actuator bracket (MICRO AD5721R) conforms to *AN3169-1*. For use with single-pole double-throw switch (MICRO BZ-R31) which conforms to *AN3210-1* or with split contact double-throw switch (MICRO BZ-3YT) which conforms to *AN3216-1*.

10 Momentary position two-unit toggle switch assembly for actuating two double-throw VA-1 switches. Actuator assembly with switches conforms to *AN3236-2* (MICRO LAT2). The MICRO VA-1 switches in the assembly conform to *AN3234-1*.

11 Actuator bracket (MICRO MC2711) conforms to *AN3168-2*. Designed for use with MICRO single-pole, double-throw basic switch BZ-R31 which conforms to *AN3210-1* and with MICRO split contact double-throw basic switch BZ-3YT which conforms to *AN3216-1*.

12 Actuator bracket (MICRO MC2711) conforms to *AN3167-1*. For use with MICRO single-pole double-throw basic switch BZ-R31 which conforms to *AN3210-1* and MICRO split contact double-throw basic switch BZ-3YT, which conforms to *AN3216-1*.

13 Actuator bracket (MICRO MB2711A) conforms to *AN3166-1*. Designed for use with MICRO single-pole double-throw basic switch BZ-R31, which conforms to *AN3210-1* and MICRO split contact double-throw basic switch BZ-3YT, which conforms to *AN3216-1*.

14 Small, compact MICRO VA-2A normally-closed switch conforms to *AN3234-3*.

15 Small, compact MICRO VA-2A normally-open switch conforms to *AN3234-2*.

16 Small, compact MICRO VA-1 double-throw switch conforms to *AN3234-1*.

17 Split contact double-throw "pin" plunger basic switch (MICRO BZ-3YT) conforms to *AN3216-1*.

18 Single-pole double-throw "pin" plunger basic switch (MICRO BZ-R31) conforms to *AN3210-1*.

19 Single-pole double-throw "S" plunger basic switch (MICRO BZ-7R8T) conforms to *AN3215-1*.

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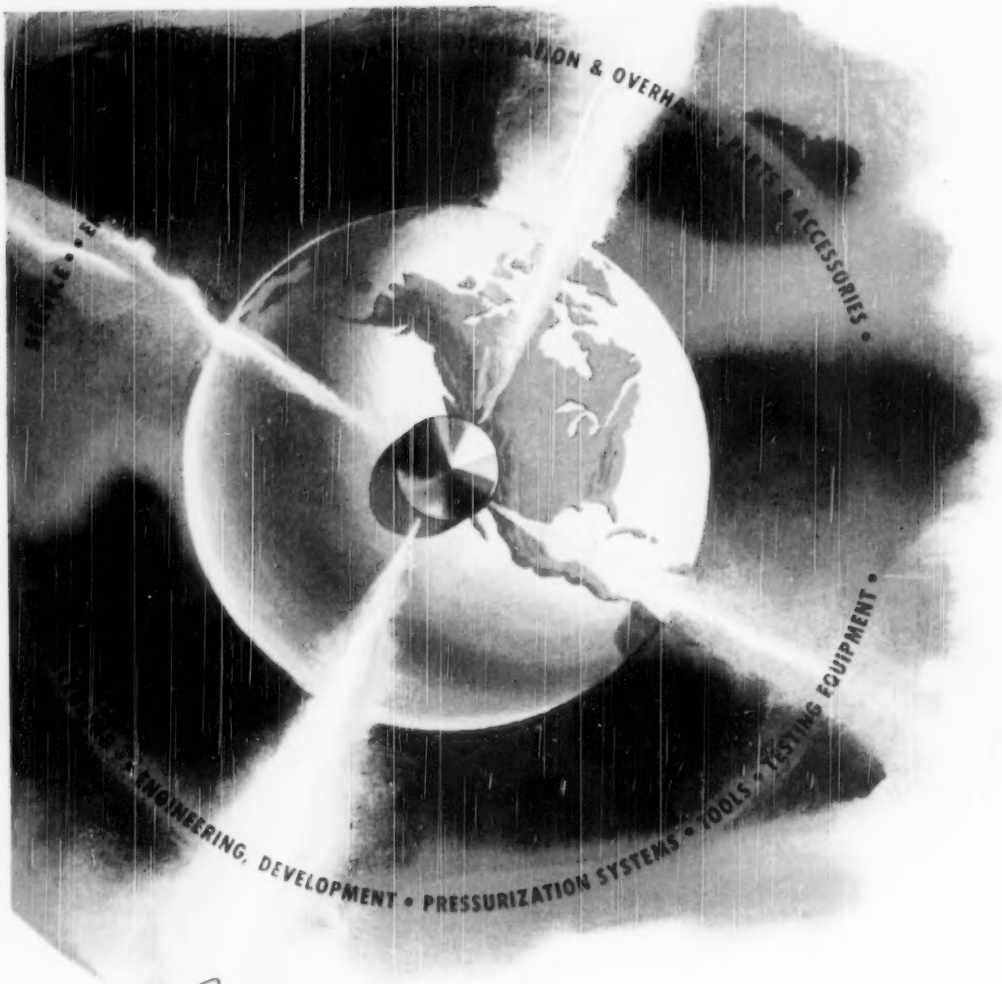

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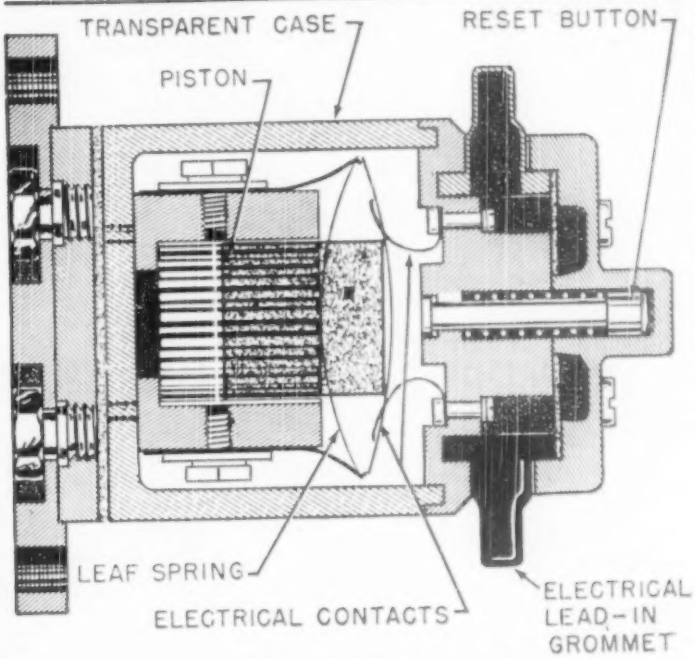


SWITCH is actuated by piston. When piston moves forward (shown shaded) it snaps leaf spring to bridge electrical contacts. In off position, spring is bowed back.

Simplified Crash Fire Switch

U. S. market now being offered new design of device long used in Britain to actuate fire prevention systems.

Several major airlines and engineers of the Civil Aeronautics Administration are evaluating a new fire prevention crash switch being readied for production by Simmonds Aerocessories, Inc., Tarrytown, N. Y.

The new switch features the latest improvements in crash switch design. It was developed by the world's leading producer of this type equipment, Graviner Mfg. Co., Ltd., England. Simmonds has obtained sole rights to produce these units in the United States.

These crash switches, now standard equipment in British military and commercial craft may be one reason that in recent years Britain's crash fire record with four-engine planes has been better than this country's.

▶ **New Design**—The new switch differs considerably from previous models put out by Graviner. A major change is that the pendulum unit used up to now to close switch contacts at impact, has been replaced by a piston-actuated mechanism. The device is set to operate automatically at a longitudinal airframe deceleration of 5 G or more, but can be adjusted to any desired setting.

Simmonds says it is accurate to ±0.15 G. In general, design of the new unit appears to be more straightforward, compact and simpler than that of its predecessors.

At crash impact, it will electrically actuate fire extinguishing equipment and aid cut-off solenoids, battery cut-out switches, signaling devices and other equipment needed in crash emergency.

▶ **How It Works**—In this switch, the floating piston normally is held in the set position by a bow spring. At decelerations of 5 G or more, momentum of the weighted piston overcomes the holding effect of the bow spring, causing the spring to snap forward and bridge a set of electrical contact points to operate required circuits.

Reset button and electrical connections are readily accessible by removing a sealed cover at the front end of the switch. Pressing the button resets the steel spring and returns the piston. Position of the spring and piston can be determined visually, the body of the switch being transparent.

Two neoprene grommets protrude from the front cover as lead-in protection for electrical connections. The 12 oz. unit is 3¼ in. long and is provided with a 2¼ in. square pad accommodating four ⅝ in. mounting holes.

▶ **Other Switches**—Simmonds is not the first company in the U. S. to produce switches based on Graviner patents. Walter Kidde & Co., Inc., Belleville, N. J., has turned out thousands of pendulum-type inertia switches for actuating detonating circuits to destroy IFF radar equipment in a crash.

A different approach to crash switch design is a recent development of another English firm, Cathodeon, Ltd. This is a "frangible" switch which consists essentially of a small glass cylinder containing a spring mechanism and suitable electrical connections.

This unit is attached internally to the aircraft skin so that it fractures and completes the crash circuits when skin deflection in the area is greater than normally encountered.

While Britain has enthusiastically endorsed the crash switch to the extent of making its installation in aircraft mandatory, U. S. carriers have taken a decidedly more cautious approach.

Three factors apparently influence this attitude:

- **A fear** that crash switches might operate at the wrong time.
- **The view** that crash fires will be cut down significantly only by attacking basic causes for fire through changes in aircraft design.
- **Uselessness** of a crash switch diminishes in proportion to the ineffectiveness of the fire extinguishing agent.

In answer to fears that these switches may operate at the wrong time, Jerome Lederer, director of the Flight Safety Foundation, told AVIATION WEEK that his group has received no reports from the British on premature operation of crash fire switches. He concedes some incidents of this type may not have been reported.

Kidde says it has heard of no cases where IFF radio has been inadvertently detonated since 1944, but there were several such incidents in the early stages of the war when inertia switches first were used with this equipment.

▶ **Good For Now**—It will take time to remove through improved design basic causes for fire. The British view appears to be that the crash switch used with effective fire extinguishing equipment is a step in the right direction. Even in the long run, success in overcoming this problem probably will depend on the use of highly sensitive, automatically-controlled crash systems combined with improved aircraft design.

While safety experts generally feel that methyl bromide (CH_3Br) fire extinguishing systems are more effective and weigh less than CO_2 equipment used by U. S. carriers, engineers point out that methyl bromide has the disadvantage of being highly toxic and corrosive in its normal state.

CB (CH_2ClBr) fire extinguisher, developed by the Germans and extensively tested by the Air Force, CAA and Kidde, reportedly has the superior fire extinguishing qualities of methyl bromide, but is considerably less toxic and somewhat less corrosive. Further, CB can be used in the same Kidde equipment now used for methyl bromide.

Military planes equipped with methyl bromide systems are the B-29, B-36, F-82, Fairchild C-119, and the Grumman SA-16A. P-61 Black Widows and the JRM Mars flying boat built during the war also were similarly equipped.

The Air Force has issued a specification on CB, and the entire AF aircraft fire extinguishing specification will be revised shortly to permit use of CB only. The Navy, on the other hand, will continue use of methyl bromide pending further investigation. Major producers of CB are Dow Chemical Co., Midland, Mich., and Michigan Chemical Corp., St. Louis, Mo.

Kidde says its methyl bromide (or CB) systems could be used effectively for automatic crash fire prevention if crash switches were included.

▶ **British Experience**—A prerequisite for evidence in favor of automatic crash systems in Britain's immunity to serious crash fire and of the way. Out of 14 fatal crashes, 70 were not followed by fire. Authoritative studies on this country indicate that if these were U. S. transports, chances are that any fire 30 percent would have caught fire.

Information on what part Gravner system and has coupled with methyl bromide systems played in allaying the British fears will be recorded.

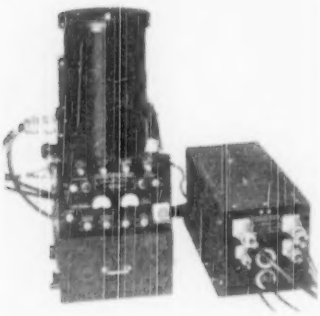
In this connection, CAB is expected in August to submit the results and recommendations a request recommendations that each engine and feature of all cases transports be provided with automatically operated crash fire protection to be released at a predetermined deceleration force.

▶ **UAL Work**—United Air Lines already has developed an inertia switch of its own—but not for fire protection. This switch is designed to turn on flashlights located in the plane to indicate evacuation passages and exit points in a crash.

This unit is used with conventional right-angle flashlights mounted in special brackets. Each light has its own inertia switch, adjusted to trip at a deceleration of 3.5 G. and designed to be reset. All that is required to adapt this device to a flashlight is to remove the bottom cap normally installed and screw on the new unit in its place.

With the service-tested crash switch apparently performing favorably for the British, the trend toward adopting these units for crash fire prevention seems to be getting stronger. U. S. airlines are beginning to give time and serious study to the crash switch.

NEW PRODUCTS DIGEST



Weather Aids

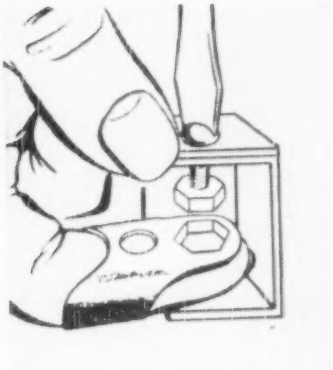
Line of dew point indicators for airborne, airport and laboratory use have been developed by **Cook Research Laboratories**, 1427 Diversey Pkwy., Chicago 14, Ill.

These instruments measure dew point or frost point in the air by indicating temperatures of a small mirror surface which is controlled automatically in such a manner that a thin film of dew or frost of constant thickness is maintained on its surface at all times.

Type D-1 indicator can be used at airports or other remote ground locations such as weather towers. It can be left unattended and operates indefinitely.

Type D-2 (shown) has special power unit (right) to permit its use in aircraft. It will operate for 8 hours without refilling with coolant. Indicator designed for laboratory use is designated Type D-3. It is intended for colour operation only and goes for 8 hours without refilling.

All three units operate on 110v. a.c., 60c. current, have a response of 5c./sec. Temperature range for D-2 and -3 indicators is −80 C. to 40 C., while range for D-1 is −30 C. to 40 C.



Fingertip Wrench

"Touch 'N' Grip" fingertip wrenches, distributed by **Skyproducts**, Ottsville, Pa., can be used in tight places and out-of-sight locations in aircraft to place and hold nuts without fumbling.

Wrench is worn like a thimble and picks up nut in hexagonal opening. It is made of nickel-plated steel and is supplied in sets of four to fit ¼, 5/16, ⅜ and ⅞ in. hex nuts. Maker is F. L. Redfield Co., Dumont, N. J.

Lightweight Motor

A small 1/50 hp. motor produced by **Mission Electric Mfg. Co.**, 132 W. Colorado St., Pasadena 1, Calif., has an efficiency rating of 70 percent and weighs 9 oz.

Unit is designed to conform to Air Force Specification 32590. It operates on 115v., 3 phase, 400c. current. Motor has diameter of 2 in. and length of 1¾ in. Power ratings up to ¼ hp. are available in the same frame diameter, maker says.

FIFTH TRANSCONTINENTAL ROUTE, this one for EAL, is recommended by a CAB examiner to link Miami and the West Coast.

EAL a Step Nearer in Coast-to-Coast Bid

Examiner recommends routes be pushed west from San Antonio with restrictions to protect existing lines.

Eastern Air Lines will become the fifth transcontinental trunkline if the Civil Aeronautics Board follows the recommendations of one examiner.

In his report on southern service to the West, Examiner J. Earl Cox has urged that EAL's routes be extended from San Antonio to San Francisco, Oakland via El Paso, Tucson, Phoenix, San Diego and Los Angeles. He also recommended that the American-Airlines-Delta Air Lines equipment interchange, which now provides one-plane service between the southeastern states and the West Coast, be approved on a permanent basis.

The proposed new links would add 2325 route miles to EAL's system, making it almost as large as United's but smaller than American's. Eastern already has a larger domestic system than the two transcontinental trunklines—Northwest and TWA. Eastern would need about nine additional Constellations to service the new routes.

Cox called for denial of American's bid for new routes between Los Angeles and San Francisco, between El Paso, San Antonio, Houston and New Orleans, and between Dallas, Houston and New Orleans. He also urged rejections of Braniff, Continental, Delta and National for New Orleans-California links.

▶ **Better Service Needed**—The examiner said the public convenience and necessity require establishment of better service from such southern cities as Miami, New Orleans, Houston and San Antonio to California. He emphasized, however, that Eastern should not be permitted to engage in unrestricted competition with American, TWA and United for the New York-West Coast market. The report suggests safeguards to prevent such competition.

With the new extension, EAL's shortest possible one-stop New York-Los Angeles flights via Charlotte would be 194 miles longer than a transcontinental run via Chicago and would afford no comparable intermediate traffic generating point. Cox said that by far the most the impact of EAL's New York-California coupon traffic would be light, the examiner recommended that all of Eastern's transcontinental flights between the West Coast and Richmond, Va., or points north thereof, Boston, New York, Philadelphia, Washington, etc., be required to serve at least three points between El Paso and Richmond.

▶ **Diversion Pro and Con**—Cox said his proposed restrictions should prevent EAL from encroaching on the transcontinental potential of American, TWA and United. "If even with such limitations Eastern could attract any large share of New York-California business, it would be a reflection on the adequacy of the services offered by the other established carriers," he declared.

American, which has the most to lose by EAL's transcontinental competition, estimated it would be subject to $26,128,000 worth of annual traffic diversion if the new service were OK'd. TWA sees a possible diversion totaling $17,574,000 and United $18,019,000.

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Ninety-four percent of Eastern's new through traffic would be diverted from other carriers, according to American. But Cox contends that in view of his proposed restrictions these figures are unrealistic. He says they represent maximum possible diversion based on the assumption that EAL could compete or bid effectively for transcontinental traffic from the Northeast to the West Coast.

Besides the restrictions on EAL's through transcontinental service, Cox would protect competing carriers by preventing Eastern from operating shuttle trips between San Diego, Los Angeles and San Francisco and by barring service to El Paso and San Antonio on the same flights.

▶ **No Subsidy Hike**—The examiner's report asserts that Eastern's transcontinental service could be conducted without increased cost to the government in the form of mail pay to EAL or any other carrier affected by the new route. Eastern President E. V. Rickenbacker, in seeking the new link, offered to operate it without any subsidy mail pay.

Cox said competition between EAL's new transcontinental service and the American-Delta DC-6 interchange at Ft. Worth/Dallas should insure a high level of efficiency and public service by both operations. The AA-Delta interchange was inaugurated last September on a temporary basis pending CAB's decision in the southern transcontinental route case.

▶ **Interchanges Inadequate?**—The report shows a marked lack of enthusiasm for equipment interchanges as a means of providing faster and more convenient airline transportation. This, Cox believes, is particularly true where major deficits in service are involved—as on the southern transcontinental run. CAB members will study this phase of the report closely since, during recent years, they have expressed hope that interchanges could keep new domestic route certifications to a rock-bottom minimum.

Eastern's coast-to-coast operations would be conducted initially with Constellations. Suggested schedules call for five roundtrips daily to the West, three of which would originate in Miami and two in New York.

Domestic Traffic Up But Earnings Down

The 16 scheduled domestic trunklines shattered all traffic records during the first half of 1950, but earnings during much of the period fell below the 1949 level.

While final data for May and June are not available, it is apparent that domestic airline passenger and cargo business in these two months was nothing short of spectacular. In some cases, carriers had to scratch around for enough equipment to handle peak weekend loads, and passenger waiting lists reappeared.

Crash of a Northwest Airlines DC-4 air coach in Lake Michigan June 24 did not have serious nationwide effects on the traffic level, although some loss of business from cities in areas closest to the accident was considered inevitable. One carrier reported a few passengers shifting their reservations from air coach to regular-fare flights after occurrence of the mishap.

During the first quarter of 1950, passenger business was up 9 percent over the same 1949 period. In April the gain was nearly 11 percent. Even better results, especially on the transcontinental trunklines, are expected when all figures are in for May and June.

▶ **World Record Set**—American Airlines during May broke all records for the number of passenger miles flown in one month by a single carrier, beating its own mark set in June, 1949. AA's passenger mileage soared 12.9 percent over the same month last year, and its load factor was 68.1 percent.

The carrier's May freight ton mileage zipped 22.7 percent ahead of May, 1949; express traffic gained 21.3 percent, and mail rose 15.1 percent. American's transcontinental coach service operated at 90.1 percent of capacity during the month, carrying 6209 passengers.

American, United and TWA all reported record traffic during the first three weeks of June.

United said passenger business on June 18 was the best in its history. TWA's transcontinental passenger traffic from June 10-16 was 13.5 percent ahead of the same period last year and reached an all-time peak. Average load factor on all TWA flights in the record week was 79.2 percent, with the coast-to-coast coach flights running at 90 percent of capacity.

▶ **Profits Down**—Meanwhile, earnings reports were less gaudy. The 16 domestic trunklines finished the first four months of the year with a $1,158,000 operating loss, compared with a $527,000 operating loss in the same 1949 period. Although revenues gained 5.6 percent, expenses jumped 6 percent.

The industry was well in the black by the end of May, but May and June of 1949 were also extremely profitable. Even with record traffic there was some doubt that the $10,460,000 operating profit shown at the end of first-half 1949 could be equaled this year.

Big factor in the earnings decline was Northwest Airlines' losses. During the first four months of 1950, NWA had a $4,368,000 operating deficit on its domestic services. In the same period last year, it lost only $1,250,000.

▶ **Strike Recovery**—American has come back with a bang after a comparatively poor first quarter, when it was hurt by a strike. It showed a $1,517,000 operating profit in April, compared with $1,193,000 in the same month last year. AA's May profits are also expected to be well ahead of 1949.

Other domestic carriers doing better financially in the first four months of 1950 than in the same period last year were Braniff, Capital, Delta, Eastern, Mid-Continent, National, TWA, United and Western. Besides Northwest, those losing ground profitwise included Chicago & Southern, Colonial and Northeast.

Plan Saves Time on Capital Super DC-3s

An agreement between Douglas Aircraft Corp. and Capital Airlines will help the carrier get its new Super DC-3s into service faster.

Three weeks prior to delivery of the first Super DC-3 to Capital, Douglas is lending that airline the engineering prototype aircraft. Capital will thus be able to conduct with a minimum of lost time and expense all of its proving runs for Civil Aeronautics Administration and its flight crew training.

When the first Super DC-3 is delivered in mid-July, it will merely be necessary to "brush her out and put her into service," L. H. Caldwell, Capital's chief engineer, says.

Capital will have its complete fleet of three Super DC-3s by mid-August and plans to put them into service on Capital's "Tobacco Road," from Washington to Norfolk and Memphis. The route has 14 stops with average hops of about one hour.

BOAC Optimistic

British Overseas Airways Corp. believes it is no longer carrying excess weight into its competitive fight for traffic.

Sir Miles Thomas, BOAC chairman, says his company is now a "lean, hardy and efficient organization with a high power-weight ratio." Since April, 1948, he declared, 47 persons in high salary brackets have been dropped from the payroll. Total personnel is 17,207 for the merged BOAC and British South American Airways Corp., compared with 24,464 for BOAC alone in 1947.

▶ **Productivity Soars**—Capacity ton miles produced per employe rose from 8005 in 1947-1948 to 7396 in 1949-50. Recent advance traffic bookings on the highly competitive North Atlantic run have doubled those of the same period last year.

The chairman attributed BOAC's substantial setbacks for the past year to:

- Sterling revaluation.
- Use of York aircraft on South American routes after Tudors were withdrawn from service.
- Training crews for new transports.

But the carrier is already showing reduced deficits from substitution of modern, pressurized landplanes such as Canadairs for older flying boats.

▶ **Boeings Help**—BOAC reports steady improvement in on-time performance on its all-Stratocruiser New York-London service. In May, for the third straight month, not one flight over the route was canceled at either terminal.

The British carrier hopes to have its mail rate increased shortly. Sir Miles said that if BOAC were paid as much per ton for carrying mail as its principal American contemporary received on trans-Atlantic flights between January and September, 1949, his company's revenues would have been increased by about $9,520,000.

Stakes are High in Mail Rate Cases

Airlines have $229,255,000 at stake in mail pay increase cases now pending before the CAB, according to their tabulation submitted to the Senate Appropriations Committee.

The cases cover payments for the calendar years 1944 through 1950. CAB reported total increases sought by categories of carriers, as follows: domestic trunk lines, $110,978,000; feeder lines, $12,582,000; territorial carriers, $723,000; Alaskan carriers, $1,994,000; and international carriers, $102,978,000.

LAI Will Fly North Atlantic Route

Another European flag carrier is preparing to start scheduled operations over the hotly competitive North Atlantic airlines.

The Italian company, Linee Aeree Italiane, has received a foreign air carrier permit from the Civil Aeronautics Board. LAI hopes to start weekly Rome-New York DC-6 service on July 15, boosting schedules to twice weekly in August. Intermediate stops will be at Dublin or Shannon, Eire, Gander, Newfoundland, and Boston.

▶ **Control Shared**—TWA, the U. S. flag line certificated to Italy, owns a 40 percent stock interest in LAI but takes no active part in managing the Italian carrier. The Italian government controls 40 percent of LAI's stock; private Italian companies hold the remaining 20.

LAI has been operating domestic Italian services since early 1947, and has extended its routes to Istanbul, Tunis, Athens, Alexandria and Tel Aviv. It may also activate a link to

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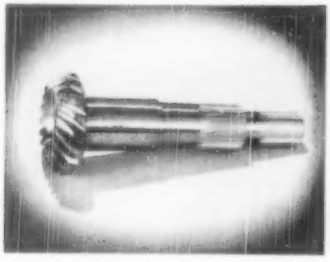

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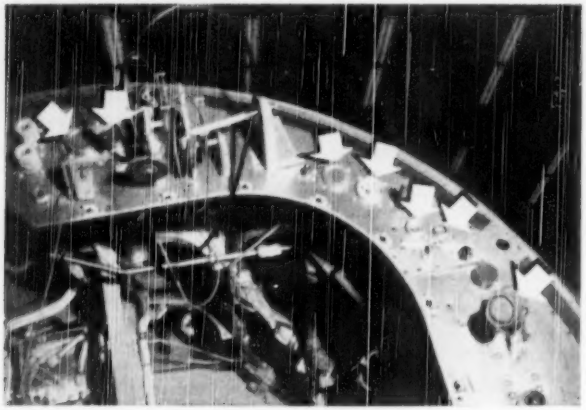
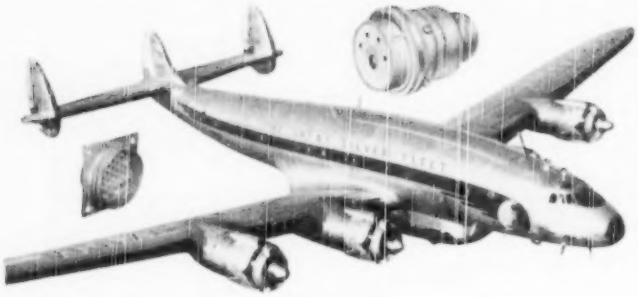


Arrows point to several Cannon Type K Firewall Connectors on portion of Constellation Engine Firewall. Included are Flame Barrier and Fireproof Types.



Just as Cannon Electric pioneered and developed the standard multiple-circuit electric connector for the aircraft industry back in the 30s, Cannon also was first to meet the requirements of the aircraft manufacturers and airlines under CAA regulations for engine firewall or bulkhead fireproofing toward the greater safety in air travel.

Cannon Firewall Connectors, whether in the "K", "RK" or "FW" AN series are made in two fundamental types: Flame Barrier and Fireproof. Both types have steel shells and are used with steel conduit. The main difference is the material of the insulators, and type of contacts.

Complete information on Cannon Firewall Connectors is given in ANF Bulletin and the Firewall Section of the K3 Bulletin. Both will be sent gratis upon request.

Address Cannon Electric Development Company, Division of Cannon Manufacturing Corporation, 5899 Hollywood Blvd., Los Angeles 28, California. In Canada, Cannon Electric Company Ltd., Toronto. World Export: Frazar & Hansen, San Francisco, Los Angeles, New York.

SINCE 1915

CANNON ELECTRIC

Stockholm via Munich and Frankfurt, Germany.

The Italian carrier has three 45-passenger DC-6s on order from Douglas, with delivery expected this summer and fall. Pending their arrival, LAI will use two DC-6s leased from Douglas for training and initial operations.

Vacation Air Travel Cost $164 Million

Airline fares accounted for about 10 percent of all transportation expenditures for vacation travel during the 12-month period ending May, 1949, according to a nationwide survey conducted by the Curtis Publishing Co., Philadelphia.

The study shows that out of total revenue for vacation transportation of $1,709,500,000, the slice for U. S. airlines was $164 million. This compares with the railroads' share of $420 million for Pullman and coach fares.

The impact of air coach service on the vacation travel market is not reflected in this study. Air coach activity didn't reach significant proportions until after May, 1949—having been pioneered only about six months before when Capital Airlines initiated low-fare "Nighthawk" service between New York, Pittsburgh and Chicago.

While airlines ranked third—after automobiles and railroads—in amount

LARGEST FEEDER

Reaching from the Mexican border almost to Canada, Frontier Airlines' newly activated short-haul network will serve 47 towns in seven states when in full operation. The feeder's 4900-mi. system is larger than the domestic route mileage of eight trunklines: Braniff, Colonial, Continental, Inland, Mid-Continent, National, Northeast and Western.

spent for vacation transportation, they dropped to fourth place as a means of conveyance. Of total trips made during survey period, 79.5 percent were by automobile, 12.7 by railroad coach, 10.8 by bus, 5 by railroad Pullman, and 3.4 by airlines. Ships (except overseas) accounted for 3.1 percent of total trips, followed by overseas ship lines with 0.2 percent. Total exceeds 100 percent because many families used more than one method.

Percentage of total vacation trips by all methods by season was: winter, 11.5; spring, 12.5; summer, 49.9; fall, 26.3. And of total trips during each season, airline travel accounted for: winter, 5.6 percent; spring, 4.4; summer, 2.6; fall, 3.5.

About two million trips, or 4.6 percent of total, were outside the U. S., with Canada the nation most favored for visiting.

CAB Closes Capital Colonial Studies

Civil Aeronautics Board has closed its three-year-old investigations into the finances, routes and operations of Capital Airlines and Colonial Airlines without making any findings. The Federal agency said it was too busy to handle the cases in the way it had originally intended.

The investigations were begun during March and April, 1947, together with similar probes of Chicago & Southern Air Lines, Northeast Airlines and Western Air Lines. CAB staff members made field studies of the carriers, and the companies themselves submitted special reports to the Board.

▶ **Financial Crisis Cited**—But so many emergency mail rate cases took place during the industry's financial crisis in 1947 and 1948 that CAB's limited staff was unable to complete work on the investigations, except in the case of Chicago & Southern. Because the data obtained in the Capital and Colonial probes is now too old, the proceedings have been closed.

The Northeast and Western investigations were enlarged by CAB early in 1949, and these cases will remain open.

Jury Clears Pilot In Seattle Crash

Pilot of an Alaska Airlines DC-4 that crashed at Seattle-Tacoma Airport in November, 1947, killing nine persons, has been cleared by a Federal jury of CAA charges that he operated his plane in a "careless and reckless manner."

But pilot James E. Farris was found guilty of attempting an unauthorized instrument landing at nearby Boeing Field before the accident. The attempted landing at Boeing Field was made when ceilings were below CAA minimums. A $1000 fine had been asked by the government on this charge. The jury recommended a $100 fine.

▶ **Fast Landing**—Government attorneys charged that Farris landed at excessive speed and half-way down the runway at Seattle-Tacoma Airport. (The Civil Aeronautics Board's official report on the accident had made similar findings.)

Farris maintained he did his best to make a safe landing despite engine roughness, poor visibility and defective brakes. The government and the investigation after the crash showed no evidence of mechanical failure.

Sierracin Panels

Capital Airlines will have Sierracin panels installed in both the inner and outer windows of the five Model 049 Constellations soon to be delivered by Lockheed Aircraft Corp.

This installation is expected greatly to increase the safety of the aircraft's windows.

SHORTLINES

▶ **American**—President C. R. Smith says his company has no present intention of buying either turbojet or turboprop

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transports. He feels that while jet engines have "great potentiality" they must become more reliable and economical. "If we were using jets today we would have to increase fares, whereas we are trying to lower them." Smith thinks it will be "around five years" before jet planes are flying on scheduled airlines.

▶ **American Overseas**—Has inaugurated a new four-days-a-week internal German air service between Hamburg and Berlin.

▶ **Braniff**—Freight traffic set new company records in May, with domestic cargo revenues up 93 percent and international cargo revenues up 183 percent over the same month last year.

▶ **British European Airways**—Is now earning dollars—from American passengers carried in England and Europe—at the rate of $1,750,000 a year. BEA's passenger traffic in April was 39 percent ahead of the same month last year, and revenues were better than budget estimates.

▶ **California Central**—Has sold one 28-passenger DC-3 to Hawaiian Airlines and four similar craft to Parks Air Lines. The California intrastate line will replace the DC-3s with DC-4s.

▶ **Civil Aeronautics Board**—Has suspended letters of registration held by three large irregular carriers for failure to file quarterly flight reports. Nonskeds affected are: Economy Airways, New York; Golden Airways, Manhattan Beach, Calif.; and Skyways International Trading & Transport Co., Miami. . . . A firm of management engineers has begun a $25,000 efficiency study of CAB and will attempt to streamline the agency's work.

▶ **Continental**—CAB has placed in effect new mail rates designed to wipe out CAL's 1949 losses and to permit profitable operations this year (AVIATION WEEK June 19).

▶ **El-Al Israel National Airlines**—Has received a temporary foreign air carrier permit from CAB authorizing service from Israel to New York for a one-year period. The government-owned carrier has four DC-4s and has hired 25 Americans as a nucleus for its flight and maintenance staff.

▶ **Flying Tiger Line**—Freight traffic on the carrier's certificated transcontinental system totaled 8 million ton miles during the six months ended Apr. 30—representing a 25 percent gain over the same period the year before. President Robert W. Prescott predicts even better results during the present six-month period. The company is operating 19 domestic stations compared with six a year ago and has more than doubled its fleet.

▶ **KLM**—Reports a loss of 39.5 million guilders (over $10 million) in 1949 compared to a profit of 173,000 guilders in 1948. Most of the deficit was incurred on the Amsterdam-Dutch East Indies route. Loss will be covered by the Dutch government, but the assistance is being granted on condition of drastic economies.

▶ **National**—Expects delivery on two of its new DC-6s by the end of July, with the other two expected in December.

▶ **Pan American**—Made 55 DC-4 flights from Puerto Rico to Michigan in eight days carrying 3100 Puerto Ricans to work in sugar beet fields. Eastern Air Lines also participated in the emergency airlift precipitated by the ocean crash of a nonscheduled Western Transport C-46 and the Puerto Rican government's cancellation of further nonsked flights.

▶ **Pioneer**—Carried 21 percent more passengers in the first five months of 1950 than in the same period last year.

▶ **Slick**—Flew 2,901,712 revenue ton miles of freight in May and believes it broke even on its common carrier business. Volume was up almost 500,000 ton miles over April, and load factor rose from 67.3 to 75.4 percent. . . . Slick was successful bidder on a contract to overhaul 269 Air Force engines.

▶ **TWA**—Is seeking CAB approval of an interchange agreement which would provide through-plane service between points west of Albuquerque on TWA's transcontinental route and points south and east of Albuquerque on Continental Air Lines' routes into Texas. . . . TWA has put one of its Boeing Stratoliners in storage after nearly 10 years and 25,000 hr. of service. First of 12 leased Martin 2-0-2As is to be delivered early this month.

▶ **Western**—Has asked CAB for a 532-mile "missing link" from Salt Lake City to Rapid City, S. D., via Casper, Wyo. It would permit WAL to operate direct flights from Los Angeles to Minneapolis-St. Paul.

CAB SCHEDULE

July 6—Prehearing conference on applications of Aerovias "Q" and Compania Cubana de Aviacion for Havana-Washington-New York foreign air carrier permits. (Dockets 2212 and 4187)

July 7—Prehearing conference on enforcement proceeding against Arctic-Pacific, Inc. Postponed from June 29. (Docket 4285)

July 10—Hearing in case involving United Air Lines' all-cargo flights. (Docket 4193)

July 10—Resumption of hearing in Colonial Airlines mail rate case. (Docket 2724)

July 17—Oral argument on renewal of Pioneer Air Lines' feeder certificate and suspension of service at certain route points of American, Braniff and Continental. (Docket 3719 et al)

July 17—Hearing on application of Líneas Aereas Costarricenses for foreign air carrier permit to operate between Costa Rica and Miami. (Docket 4194)

July 24—Resumption of hearing on renewal of Southwest Airways' feeder certificate and service suspension at certain United Air Lines points in the area. (Docket 3718 et al)

July 25—Oral argument in Cuba-Florida foreign air carrier permit case. (Docket 3717 et al)

July 26—Resumption of hearing on renewal of West Coast Airlines' feeder certificate and service suspension at certain United Air Lines points in the area. (Docket 3968 et al)

July 31—Hearing on Lehman Brothers' interlocking relationships case involving partners of firm holding airline directorships. (Dockets 3695 et al)

Aug. 7—Hearing in reopened case on additional California-Nevada service. (Docket 2919 et al)

Sept. 11—Hearing on enforcement proceeding involving interlocking relationship between Arrow Airways, Inc. and California Arrow. (Docket 4287)

Sept. 18—Hearing on renewal of Frontier Airlines' feeder certificate and service suspension at two United Air Lines stops in the area. (Docket 4340)

Sept. 26—Hearing on Mid-Continent Airlines' application to have its Route 40 certificate (Tulsa-Houston) made permanent. (Docket 3193)

Oct. 9—Hearing in Latin American air-freight case. (Docket 2889 et al)

Oct. 16—Hearing on Los Angeles Airways' application for renewal of its helicopter mail-cargo certificate and for additional authority to carry passengers. (Docket 3401)

Jan. 8, 1951—Hearing in Big Four mail rate case and CAB investigation of the carriers' economy and efficiency. (Docket 2849 et al)

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LETTERS

GCA Spokesman

Capt. R. C. Robson's article in AVIATION WEEK June 12 states, "Airlines and pilots are reporting increasing concern over the (un) reliability of ILS." As an airline passenger, averaging 50,000 miles annually, I am also concerned.

Capt. Robson lists five recent airline crashes and near misses on ILS resulting from the lack of warning of ILS's malfunctioning.

CAA officials report that the standard ILS monitor "warning" requires seventy seconds to trigger off the bell and light announcing that the equipment is unsafe.

ILS experts advise that a 500 foot area in front of the ILS glidepath transmitter must be cleared of all snow to avoid beam distortion.

Capt. Robson's statement that the new, improved "phase comparison" ILS is "unmonitorable" and his references to "swinging" localizer connections are equally disturbing, albeit not surprising.

Your editorial preface to Capt. Robson's article observes that, "it puts a serious problem up to the airline manufacturers and engineers." That is an editorial understatement. On behalf of one airliner manufacturer, I should like to correct several misconceptions which Capt. Robson has regarding GCA.

(1) GCA can monitor ILS glide slopes regardless of the location of the ILS touchdown point. While ILS is not adjustable, GCA is versatile in that the operator can draw the ILS glide slope on the GCA radar screens and watch the aircraft "blip" follow that line. It is true that the ILS glide slope has permanent bends, "false slopes," and fluctuations caused by weather, taxiing aircraft, gas trucks, etc. The GCA glide is permanently straight and not affected by weather or ground objects. Consequently, GCA can always tell the pilot precisely where he is in three dimensions with absolute accuracy and safety.

(2) Capt. Robson is also in error concerning rain effects on GCA. The Sensitivity Time Control and Fast Time Constant on all GCA equipment has enabled GCA to operate in the Aleutians, Alaska, Ireland, South Pacific, and on the Berlin Airlift in rain and snow. Except for serious line squalls and cloudbursts the Fast Time Constant enables GCA to track planes through weather.

These observations can be confirmed by the eleven U. S. and foreign airlines and hundreds of airline pilots who have completed 10,000 GCA landings at Gander and thousands of additional landings at Keflavik, Shannon, London, Paris, Berlin, Nome, Edmonton, Fairbanks, Shemya, New York, Washington, and Chicago.

Capt. Robson states that, "a ship flying through light rain at 300 miles per hour is, in effect, passing through solid water." It may seem that way to the pilot looking at the wind screen but to GCA on the ground the plane and the rain are both practically motionless. GCA microwaves "look" at the aircraft 2000 times per second so that the fundamental ratio between the speed of the plane and the rain remains constant.

(3) GCA was selected as the primary landing system by the USAF, U. S. Navy, RCAF, RAF, and USMC because GCA is *fail safe*. It is not subject to fluctuations, weather, etc. and does not require outside monitors or airborne equipment. It is "closed loop" system in that the equipment is self checking and cannot give false data. At the only three CAA airports where GCA and ILS have been in joint operation for the past three years, CAA monthly reports show more landings made on GCA than on ILS. GCA is in operation at 167 airbases around the globe and airline pilots and military pilots chalk up 2000 GCA landings every day or 700,000 annually, a far greater total than on any other landing system.

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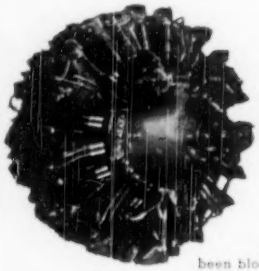

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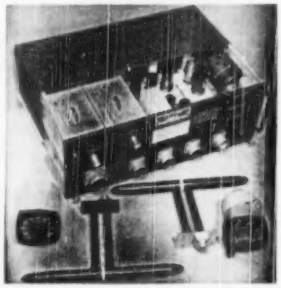

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THEY CALLED HIM UP TOO SOON—Latest story about prankish airline pilots concerns the uniformed actor who kept walking up and down the aisle of a crowded airliner in flight the other day deeply absorbed in a book prominently labeled, "How to Fly," his lips moving laboriously.

* * *

MORE ABOUT OLD TIMERS

Admiral Louis DeFlorez learned to fly in 1912 in a Wright seaplane, Jerry Lederer reminds us. Now, 38 years later, he is flying jets. "There is a safety moral here that we'll probably think of when he flies the first rocket," Jerry writes from the Air Safety Foundation.

Cord Meyer, New York real estater, who got his FAI No. 176 on Oct. 2, 1912, now is colonel in command of the New York Wing of CAP, with Command Pilot rating. Cord passed his RMA at Mineola in 1916 and was commissioned and on active duty in the old Aviation Section, S.C., early in 1917—along with Hobey Baker, B. B. Lewis, Seth Low, Charles E. Reed, and F. T. Blakeman.

Joseph A. Blondin started his air career in an 1896 balloon in Paris for suitcase from violin instruction, practiced acrobatation through 1910 and turned to the airplane and air inventions. Now he is working on a flying saucer—no less. It's a plane with a circular wing like two pie plates faced together.

All these old timers are Early Birds. And how many of you know what their qualifications must be? We'll tell you: "Membership shall be limited to those who piloted a glider or airplane, gas balloon or airship prior to Dec. 17, 1916, upon evidence deemed sufficient by the membership committee and approved by the board of governors, except that Nationals of countries other than the U. S. engaged in World War I must have met the foregoing conditions prior to Aug. 4, 1914."

* * *

DR. VON FLUGEN'S AVIATION GLOSSARY

(Continued)

HAM STANDARD—A method of comparatively evaluating pork products.
HAMMER HEAD STALL—An arbitrary method of avoiding work.
HAND FORGING—An illegal type of penmanship.
HAND FORMING—A type of plastic surgery.
HETERODYNE RECEPTION—A private gathering attended by a motley assortment of people.
HOAREFROST—Colloquial expression for an arctic front.
HYDROGEN—An alcoholic beverage consisting of water and gin.
INDUCTION SYSTEM—A network of draft boards.
INFLATION—A financial condition evidenced by a lack of sufficient money.
INVOLUTE—One who acts involuntarily.
JURY STRUT—A dance popular in legal circles.
KAPOT—A colloquialism meaning "done," "finished," or "all washed up."
LAP JOINT—A bar or other establishment having private booths and/or dim lighting.
LIGHTENING HOLES—The process of removing stuff from empty holes in order to reduce the weight thereof.
LINK TRAINER—A device to train link.
LOCK WASHER—One who washes locks.
LOUVER—An art museum in France.
LOW BRASS—An immediate supervisor.
MACH NUMBER—A quantity encountered in flying, one of which is enough of.
MAGNETIC EQUATOR—An automatic calculating machine.
MASONITE DIE—Refers to the death of a member of a fraternal organization.
MASTER OSCILLATOR—One who is adept at kissing.
MATING JIG—An animal husbandry accessory.
MAXIMUM MEAN CAMBER—This is a common fallacy among aircraft engineers. Actually, maximum does not mean camber at all.
MAXWELL'S THEOREM—States that coffee is "good to the last drop."
MECHANICAL LIFT—An automatic elevator. Also, see BRAZIER.
MEDIUM BOMBER—One who practices the suppression of spiritualistic arts by violent means.
MICROFARAD—A small official in the Egyptian government.
MICROMETER—A very small meter.
MOMENT OF INERTIA—A short period of hesitancy.

(To be continued)

* * *

TEAR JERKER—Northwest Airlines assisted the other day in a dramatic rescue operation that brought tears to most of those concerned, including big, burly freight handlers at the Minneapolis air terminal. It seems high winds, blasting their way from Dakota to the East Coast, swept into New York state and uprooted a major portion of a newly planted crop. So the call went out one day before the season deadline for an emergency shipment of seed to replant the devastated areas, and that's why Northwest was flying a thousand pounds of onion seed.

—R.H.W.

WHAT'S NEW

Destination Moon

Space travel looks pretty easy in **Destination Moon**, a George Pal production released by Eagle Lion Films. And that's the only fault to find with the entire movie, because the first Moon voyage will not compare to a Stratocruiser ride. But for once, here is a movie about flying which has had the benefit of intelligent writing, advising, and most important, directing.

It deals with the first trip to the Moon. An atomic-powered rocket carries four men on the journey, and very nearly has to leave one on Luna in order to guarantee the return trip. Around that basically simple narrative has been woven the whole cloth of current thinking on Moon rockets.

► **No Moonshine Here**—To begin with, the rocket looks big enough, and good enough, to do the job. Interior arrangements, instrumentation, structural details all bear the stamp of authenticity. The scientists talk pretty much like scientists, the rocket motor noises sound like rocket motor noises, and radio communications are anything but clearly enunciated.

But it is the special effects that steal the show right out from under the noses of the human actors. Astronomical backdrops have been painted by the incomparable Chesley Bonestell; Earth never looked lovelier than she does seen from the rocket against a velvet-black night. The lunar landscape is cold and forbidding and lonely-looking—Hell, without the flames.

The trickery behind the scenes aboard ship is wonderful, too. The crew walk up walls and float free in the cabin convincingly during the free fall portion of the trajectory; outside the ship they hang inverted and walk around the hull to an upright position.

Well, it's all good; the best ninety minutes spent in a theater since "Hell's Angels." And to make it even better, the film is in Technicolor. Don't miss seeing it now, because some day you may see another like it—the telecast of the first actual trip to the Moon.

—D. A. A.

New Quarters

Air Express International Agency, Inc. and Surface Freight Corp. have moved their general and executive offices from 467 Greenwich St. to 44 Whitehall St. The now consolidated N. Y. export and import departments have been transferred from 467 Greenwich St. and 103-02 No. Blvd., Corona, to South Ferry Slip 5 at the foot of Whitehall St.

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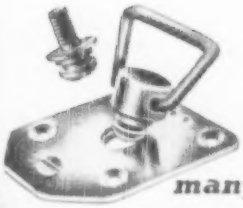

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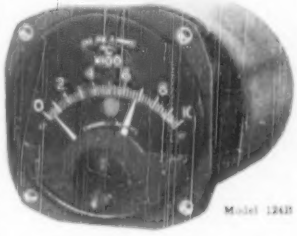

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EDITORIAL

Wider Publicity for Contracts

Industry and the public will gain from wider dissemination of information about military purchasing, announced by the Department of Defense.

As reported more fully in our issue of last week, names of firms awarded Army, Navy, and Air Force contracts of $25,000 and over will be available weekly through 1200 Department of Commerce field offices.

The three services will prepare a weekly synopsis of awards of unclassified, negotiated and formally advertised contracts.

For almost two years, one of the planks in AVIATION WEEK's editorial platform has been widest publicity for purchasing information. It was only 20 months ago that the Air Force was censoring announcement of virtually all of its negotiated contracts. Only a few were released. Since negotiated contracts usually are larger than contracts publicly bid for, it meant that an important percentage of the public dollars spent by the Air Force with individual firms in industry were never publicly accounted for.

AVIATION WEEK finally went to the then Secretary for Air, W. Stuart Symington, who subsequently ordered all unclassified negotiated contracts made available not only to this magazine but to the press generally. We have been publishing this information ever since.

The Defense Department deserves congratulations on thus making vital business and industry information freely available to those who need it. It is also, of course, in the best interests of the military services themselves to play all of their procurement cards on top of the table all the time. That is one sure way to stifle rumors of graft.

Handouts or Security?

The headlines say Congress agreed on a 70-group Air Force. Actually, the lawmakers said they wouldn't approve anything bigger than that. It's the "legal ceiling strength" of the Air Force. The truth is, they will appropriate annual sums to support a force anywhere below that top limit. It's all very confusing, but you see, politicians like to have their cake and eat it too.

Congress removed all vestiges of a provision for annual procurement of new aircraft. They also knocked out a stipulation that would have authorized the Air Force to procure 5200 new planes, or 42,500 airframe tons, every year.

So we have no national policy that insures our maintaining a healthy and adequate aircraft industry to fall back on in case the Russians become intolerable—which may mean almost anytime.

Our legislative writer points out that 70 percent of the 13,000 serviceable planes the USAF has were designed before 1940.

A few days before the Korean unpleasantness broke out Mr. Truman said we cannot afford a 70-group air force; only about 48 groups. This force is described by our military leaders as woefully weak.

But new legislation looks certain authorizing another two billion dollars to purchase surplus farm products. We already spend more money every year on price-supporting peanuts than we do on guided missiles. We now propose to throw away still another couple of billion on handouts, while we hold down our Air Force. What could be better news for the Russkys?

Abolishing the Races

So they've canceled the National Air Races for 1950! That is good for aviation. It might save lives, too.

We doubt if these races are ever held again, at least in the form we all know them. We hope the 1949 brand is gone forever.

The final blow to this year's event was Secretary Johnson's order to the Air Force and Navy to stay out.

The crash of popular pilot Bill Odom's plane into a house, killing Bill and two occupants of the house, dropped a pall over last year's spectacle. It also shocked the show management into realizing the terrible risk they were taking every year in permitting, even encouraging, high speed racers and stunters to maneuver over the heavily populated Cleveland area.

There may have been a time when the Cleveland races contributed something to the technical progress of aviation. If ever there was such a time, it is long since past. The great industry and government laboratories and wind tunnels, and the gruelling flight test programs, have taken over in an impressive style, necessarily in considerable secrecy.

Nothing was left for Cleveland but a sort of Roman holiday affair that was a menace to human life and a congenial place for aviation people to get together and hangar-fly while they paid no attention at all to the races.

Commercial aviation's whole future depends on wide public acceptance. That acceptance depends on public confidence in the present and potential safety of commercial flying. Such acceptance is growing rapidly. But despite the fact that the National Safety Council gives scheduled airlines a better safety rate than the private auto and taxicab, public acceptance of the commercial airplane still lags far behind that of the garden variety auto.

As long as it does lag behind the car, we certainly cannot afford the luxury of any Roman holidays like the National Air Races in the reckless manner to which they are accustomed.

There are still too many good, potential customers of the airlines who to this day associate non-commercial air accidents with commercial air safety. One answer to this, of course, is a national program of information and education. Another is to stop needless stunts at air shows and insure ourselves against having at least that one type of airplane accident, anyhow.

When we get the masses to the point where they stop believing that the airplane—any airplane—is inherently unsafe, then perhaps we can put on a thrill show like motordom's annual Memorial Day race at Indianapolis. But aviation has not yet reached that enviable stage. Let's help get it there as soon as possible.

—Robert H. Wood

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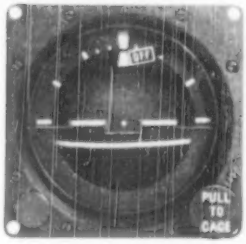
...on 8 CARDINAL POINTS!



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